COMPUTER RADIO SETUPS

MODEL AIRPLANE NEWS

THE WORLD'S PREMIER R/C MODELING MAGAZINE

48120

October 1996

Software Survey

35 PROGRAMS FOR R/C

—see page 54

Lanier RC Extra 300S

How To's

- Apply a Scale Cloth Finish
- Set Wing Incidence
- Build a Field Stand
- Reproduce Aluminum Finishes

Los Banos Slope Scale Soar-In

World's Largest R/C Model?

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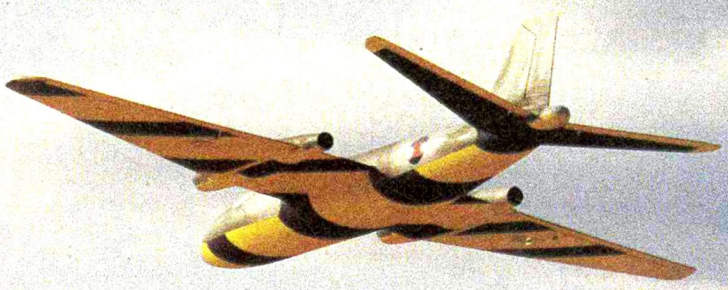

features

construction

columns

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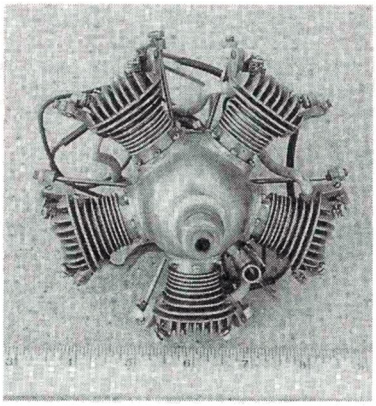
ON THE COVER: main photo—the Lanier RC Extra 300S flies by with smoke on. (Photo by Walter Sidas.) Insets (top to bottom): Lynsel Miller launches Tom Overton's Bf-109 at the Los Banos Slope Scale Soar-In. (Photo by Joe Chovan.) The Super Quaker at the Joe Nall Giant-Scale Fly-In is perhaps the world's largest R/C model. (Photo by Gerry Yarrish.)

ON THIS PAGE: Sean Sharif's Canberra bomber soars majestically overhead at the Los Banos Slope Scale Soar-In. (Photo by Dave Garwood.)

AIRWAVES

WRITE TO US! We welcome your comments and suggestions. Letters should be addressed to "Airwaves," **Model Airplane News,** 251 Danbury Road, Wilton, CT 06897-3035; e-mail: man@airage.com. Letters may be edited for clarity and brevity. We regret that, owing to the tremendous numbers of letters we receive, we can not respond to every one.



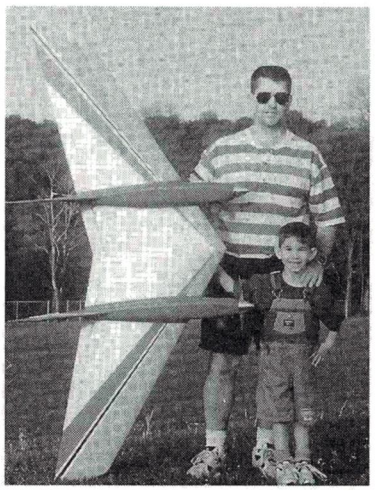
RARE RADIAL

I'm enclosing a photo of a model engine that my father has owned since the 1940s. It was made by the Morton Engine Co. of Omaha and is supposed to be a scale replica of a radial engine of that time. Other than that, we don't know much about the engine. It last ran in the '40s.

Perhaps it might be of interest to your readers. My father wants to sell the engine. I should mention that it's "frozen," but it's completely intact. He even has the original box for it. Thanks for any help.

ROBERT TWIST
San Marino, CA

If any of our readers have information on the history or value of this engine, we will forward the information to Robert. GY



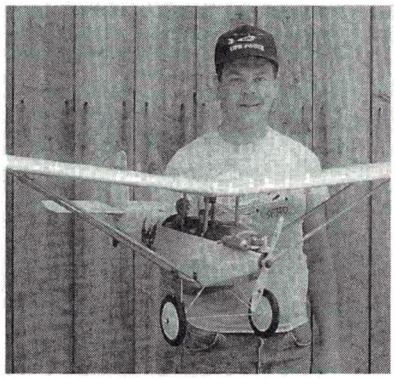
SPEED WING

I started to build this twin-powered flying wing after reading about flying at 200mph in "Final Approach" (see the October '95 issue). As you can see from the enclosed photo, it's finished, and after some test flights and experimentation, it's flying quite nicely. Here are the specs: swept span—94 inches; area—1,054 square inches; weight—12 pounds; power—two MVVS .61s with tuned pipes; features—elevons, rudders, throttles (mixed with rudder) and retractable landing gear. The estimated top speed is 220mph!

So far, I've only been able to reach about 150mph, but this was with an APC 11x8 sport prop coming out of a shallow dive (the pipes hadn't been tuned yet). I think that the 220mph top speed is realistic after some more fine tuning and a change to 10x10 props. A previous twin design of mine was timed at 150mph, and it didn't have the horsepower or the aerodynamics of this design. Let me know what you think.

BRIAN REED
Franklin, PA

Brian, your twin-speed wing looks very promising. Speed is the goal of many model designers, and it looks as if you might break the 220mph barrier. Let us know how close you get; we may want to ask you for a construction article! If there are other designers out there with conventionally powered models that can fly in the 200mph range, we'd love to hear from you. GY



DON'T TRASH THAT CRASH!

I'm 30 years old and have been flying model airplanes for three years. I've built a number of ARF kits and repaired a few crashed models. I hope to scratch-build a canard sometime soon.

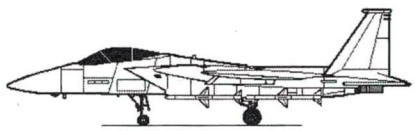
I'd like to show off this 1980s House of Balsa Pietenpol that was originally built by my friend Joe Blakeley. After an unfortunate crash, Joe put the remains in the storage shed because he didn't want to spend the time to rebuild it.

I had been helping Joe organize his shop when he mentioned the old Piet in the shed. It's one of my favorite planes, and Joe gave the remains to me—broken wings and all. It looked pretty bad; the fuselage was rotten in places, and the tail had been broken off while in storage.

I restored the model in three months by building a new wing, repairing the tail and replacing the rotten wood in the fuselage. I covered the model in Super MonoKote and put a new O.S. .25FP in the nose. I flew the model last summer and am happy to report that it's a gentle, graceful flier. I'd like to hear from other Pietenpol model builders, and I hope that my story will encourage others not to throw out their broken models.

BRIAN JONES
P.O. Box 53
Elgin, TN 37732-0053

Brian, your resurrected Piet looks great. People shouldn't be in such a hurry to trash their crashed models. In many cases, it doesn't take as much work to repair models as it does to build new ones. Once the mud and dirt have been cleaned away and the broken pieces removed, you might find that the damage isn't as bad as you thought. Also, it often costs less to repair a model than it does to buy a new kit. Thanks for the inspiration. GY



HOW-TO ARTICLES WANTED

Do you have a construction technique, building method, or design innovation that you'd like to share with other readers?

Why not publish your ideas in *Model Airplane News*?

For more information, contact assistant editor Debra Sharp (203) 834-2900.

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EDITORIAL

by GERRY YARRISH

MODELING WITH YOUR PC

R/C MODELING is moving rapidly toward the 21st century! Computers have become such a major part of our lives that it's hard to believe what is now available to the modeler. Programmable radios make setting up our models child's play and allow models to do what we thought was impossible just a few short years ago. A growing inventory of PC-based tools enable modelers to design, scratch-build, or customize R/C aircraft. Airfoil plotting packages abound. Computer aided design (CAD) software is used by countless scratch-builders and many manufacturers. Performance-evaluation programs tell us how our model designs will fly even before we build them.

Willy Grundler launches his SG-38 scale glider at the Los Banos Slope Scale Soar-In.

In this issue, we present our second survey of PC programs specifically written for modelers (the first was published in our January '95 issue). If you have a PC and want to read the latest on how to combine bytes with balsa, don't miss this feature!

SILENT SCALE

Most of the time, we think of scale models as having whirling propellers and powerful engines, but for a growing R/C population, scale has gone over the edge in the form of beautiful and graceful slope gliders. If you like the antique look of a WW II military training glider, the graceful lines of an all-composite competition sailplane, or the mean and deadly appearance of scale fighters and bombers (without propeller, of course), the Los Banos Slope Scale Soar-In was the place to be. Steady winds, grassy landing zones and noiseless performances are all part of the excitement. See this feature by Joe Chovan for a view of the action.

WORLD'S LARGEST R/C MODEL?

In "Final Approach," we have a close-up look at what just might be the world's largest R/C model airplane. It isn't a government-research, remotely piloted vehicle, but an honest-to-goodness, built-with-wood, cloth-covered, 3-channel cabin airplane. Seen at the recent Joe Nall Giant-Scale Fly-In, the Super Quaker is as big as man-carrying ultralights. Built by Pat Hartness and his friends, the Super Quaker redefines modelers' definition of big!

FOR THE WORKBENCH

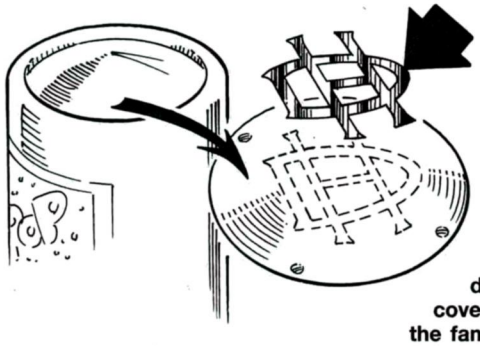
Finally, we have several how-to's to help you succeed with your next model. See Jim Sandquist's article on setting wing incidence correctly while you build your model. Proper model setup pays big dividends when you're at the flying field. This article will also be of particular interest to biplane builders.

Also, John Gorham shows us his easy-to-build model field stand that will take the strain off your knees and back and make it safer to start and adjust your model—all for a small investment of time and money. From workbench to flight line, there's something in this issue for everyone.

Hints & KINKS

by JIM NEWMAN

Model Airplane News will give a free one-year subscription (or one-year renewal, if you already subscribe) for each idea used in "Hints & Kinks." Send a rough sketch to Jim Newman c/o Model Airplane News, 251 Danbury Rd., Wilton, CT 06897-3035. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we can't acknowledge each one, nor can we return unused material.



CLASSIC COVERS

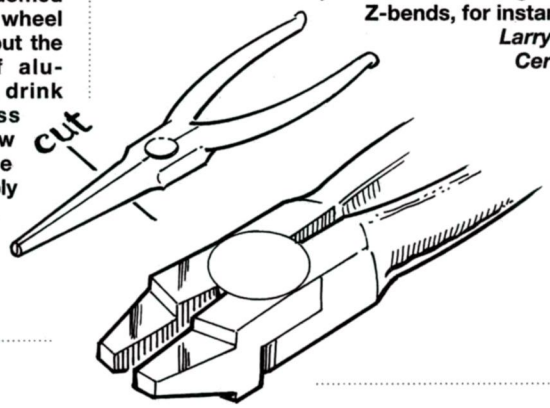
Here's an easy way to make those classic, domed de Havilland wheel covers: cut out the bottoms of aluminum soft drink cans, emboss the fixing-screw detail, paint the covers and then apply the famous D.H. logo (cut out of trim film). Carefully apply the logos over a film of soapy water to make positioning them more simple. Squeegee out the water and dry overnight.

Phillip Kent, Cleckheaton, W. Yorks, England

NEW USE FOR OLD

Shorten those old, worn-out long-nose pliers, then regrind the jaws. This will create a solid, special pliers for forming wire into Z-bends, for instance.

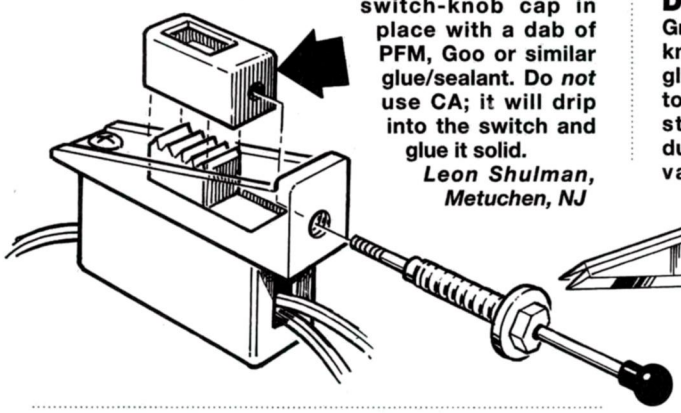
Larry Renger, Cerritos, CA



FIX THE FUMBLES

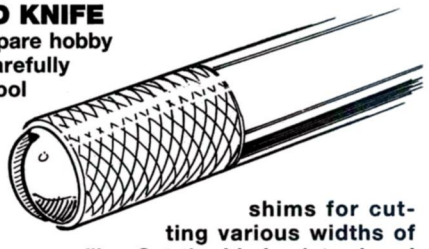
According to this AMA Hall-of-Famer, before you try to insert the Du-Bro Kwik-Switch mount on a model, make the job easier by holding the switch-knob cap in place with a dab of PFM, Goo or similar glue/sealant. Do *not* use CA; it will drip into the switch and glue it solid.

Leon Shulman, Metuchen, NJ



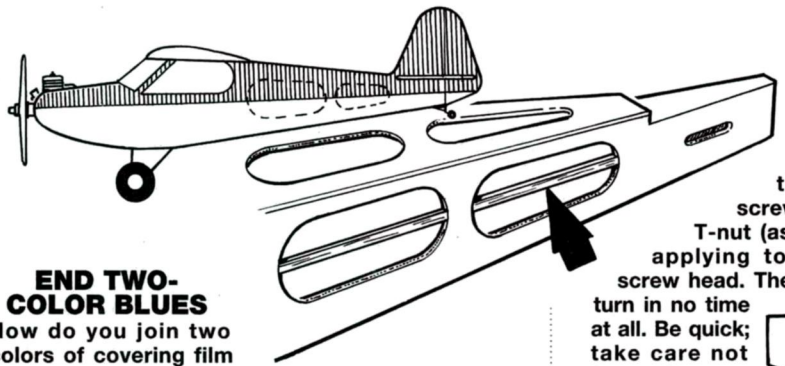
DOUBLE-BARRELED KNIFE

Grind out the collet of a spare hobby knife to fit two blades carefully glued together; use the tool to cut covering-film-trim strips. Make several dual blades of various



shims for cutting various widths of film. Set the blades into dowel handles. The new knives will easily cut curved strips around a French curve—something expensive hobby-store machines can not do.

Levent Suberk, Bursa, Turkey



END TWO-COLOR BLUES

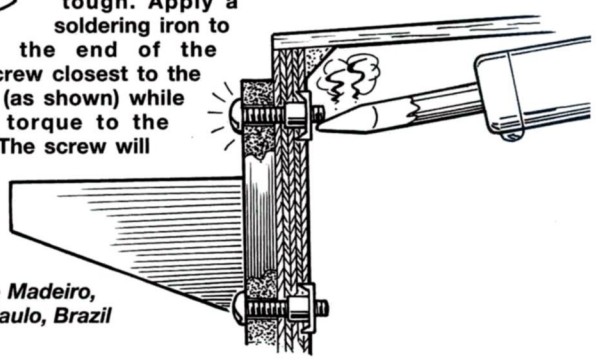
How do you join two colors of covering film over large lightening holes? It's easy! Simply add a light stringer (as shown), and seal the film to the stringer.

Gene Chase, Oshkosh, WI

UNLOCKING LOCTITE

Sometimes Loctite works *too* well, and that makes removing engines, mounts, etc., a little tough. Apply a soldering iron to the end of the screw closest to the T-nut (as shown) while applying torque to the screw head. The screw will turn in no time at all. Be quick; take care not to melt your nylon mount!

Alexandre Madeiro, Sao Paulo, Brazil



MODEL AIRPLANE NEWS

HOW TO

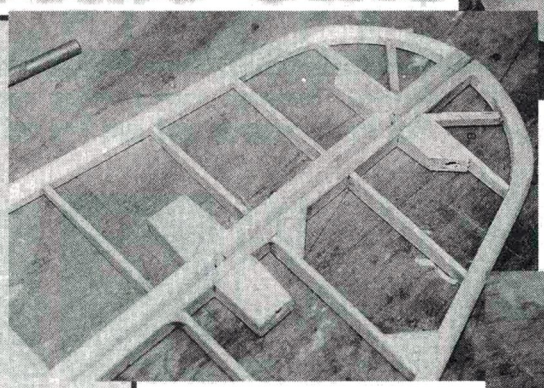
by GERRY YARRISH

The easy way to duplicate a scale cloth finish

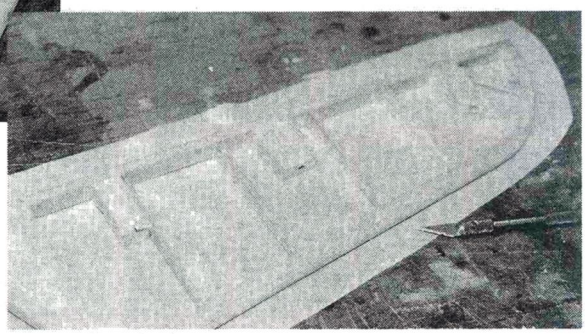
Cover a Model with Scale Stits

THERE are perhaps as many ways to duplicate a scale cloth finish as there are types of models. I've tried many techniques, all of which have good and bad points. The Scale Stits process from F&M Enterprises* is one of the easiest painting systems I've tried. Since Scale Stits uses the covering and finishing materials that are used on full-size aircraft (specially formulated and packaged for models), there's no question that the results are scale.

The basic ingredients are the heat-shrinkable Scale Stits polyester covering cloth, Poly-Tak fabric adhesive, Poly-Brush cloth sealant/primer, Poly-Spray silver pigmented undercoat and Poly-Tone color coat. All the materials used in the Scale Stits process are one-part, air-dry compounds that dry very quickly. Each part was formulated to work perfectly with the others, and F&M Enterprises does not recommend any substitutions of adhesives or paints, nor does it guarantee satisfactory results with any other polyester-cloth-covering materials. Here's how it's done:

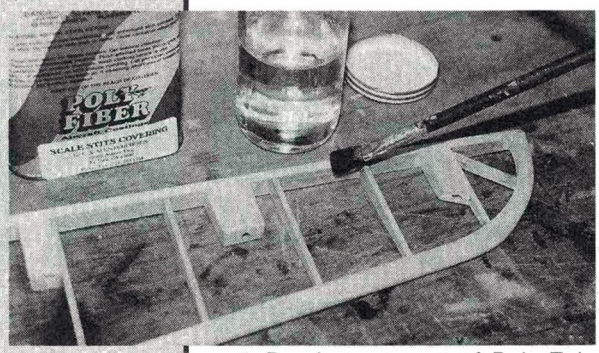


1 The few items you need to get started are Scale Stits covering, Poly-Tak adhesive, a ½- to ¾-inch-wide brush, a sharp hobby knife, paper towels and methyl ethyl ketone (MEK), which is used for cleanup.

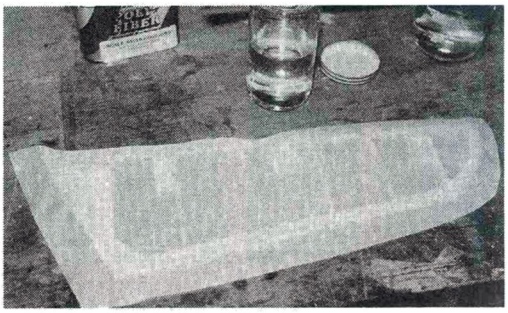


2 Here are the stab and elevator for my Aeroplane Works* PT-17 ready to cover. For a good finish, sand the model smooth, and fill all the dings, dents and pinholes with a good, easy-to-sand filler. I used Carl Goldberg's* Model Magic filler. Note the balsa blocks added for proper hinge support.

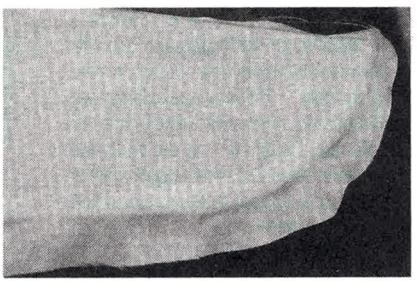
3 Place the part to be covered over the cloth, and with a sharp hobby knife, cut the cloth slightly oversize (about ½ inch larger all around).



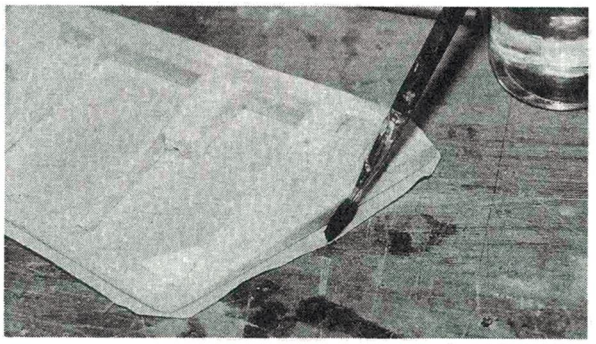
4 Brush on a coat of Poly-Tak adhesive. I find it easier to first pour the adhesive into a wide-mouth glass container than to use it straight from the metal can it comes in. Apply the adhesive quickly, and put the cloth into place while the adhesive is still wet.



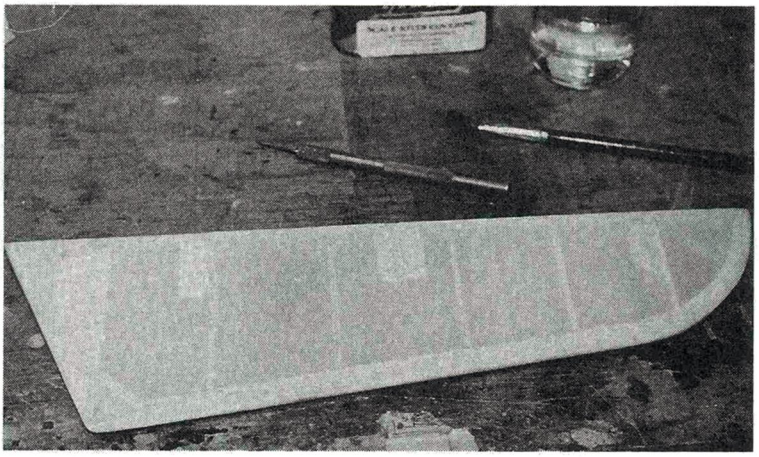
5 Work the cloth into the adhesive with your fingers for a good bond with all the contact points.



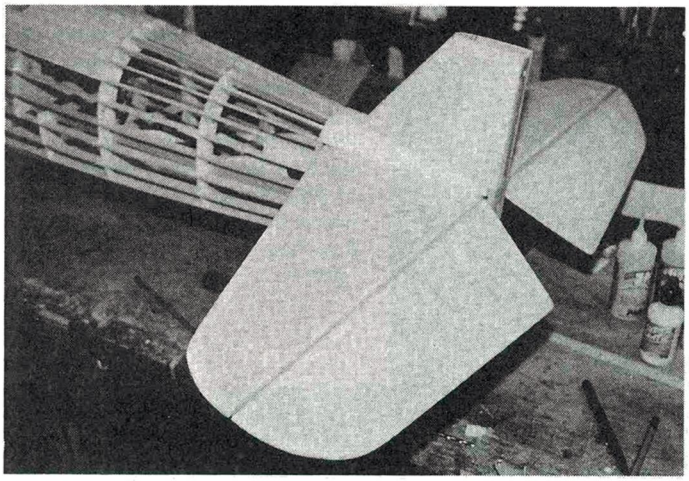
6 Pull the cloth down all around the perimeter, and pull it lengthwise to remove any large creases or wrinkles.



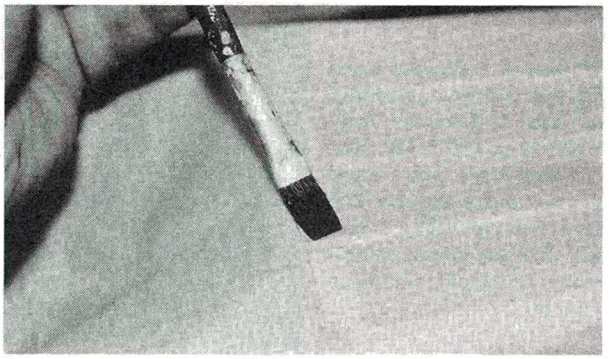
7 Trim the edges of the cloth to about a ¼-inch width, apply Poly-Tak to the cloth's underside and attach it to all the edges.



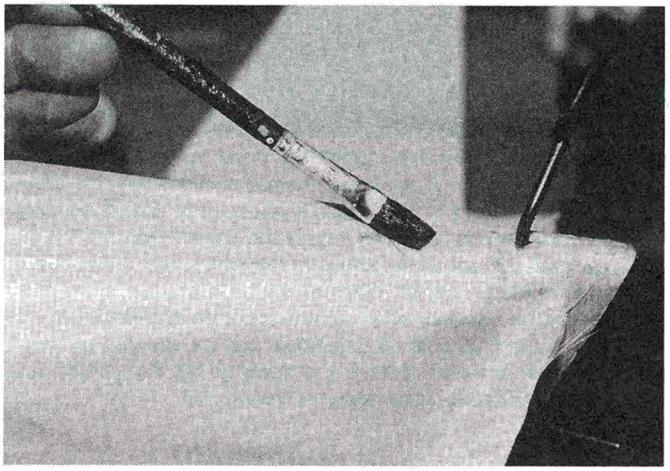
8 Here's the covered elevator. Note that there are no wrinkles even though the cloth has not been heat-shrunk. Now repeat the process on the part's uncovered side. Only after the part has been completely covered and all the edges have been glued down should you apply heat to tighten the covering. When you heat the cloth, use a covering iron, not a heat gun. A heat gun can overheat the cloth and damage it. Initially, set the temperature at about 250 degrees F. For the final tightening, use about 325 degrees F.



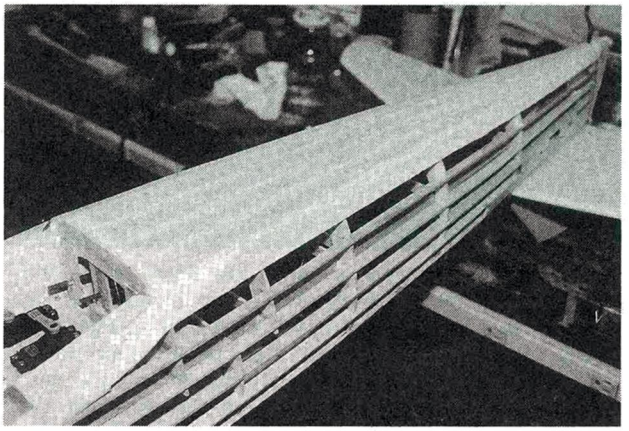
9 Here, the covered horizontal stab and elevators have been fitted to the fuselage so that the vertical stab can be glued into place before the rest of the fuselage is covered. Note that the fairing block under the vertical stab was covered with cloth before the vertical stab was added. The cloth was cut away at the contact point for the vertical stab before the stab was glued into place.



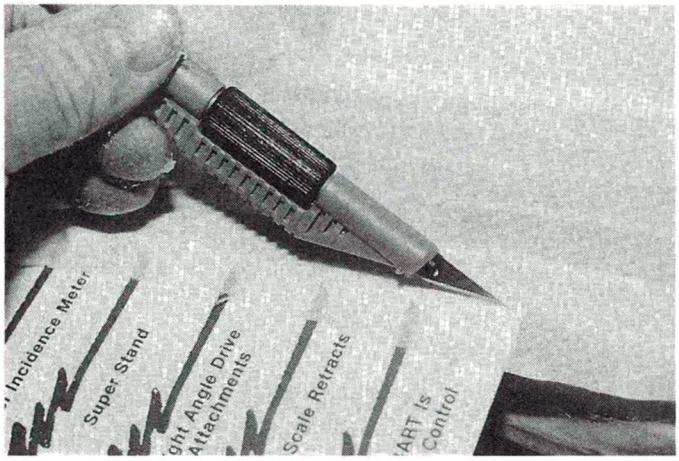
10 Start to cover the fuselage on the bottom. First, brush the glue onto the structure, and then apply the cloth while the glue is still wet. Here, I am pressing the cloth down with the brush at the trailing edge of the wing saddle. For a smooth bond, you can also apply MEK over the bonded area with the brush. The solvent seeps through the cloth and activates the adhesive beneath.



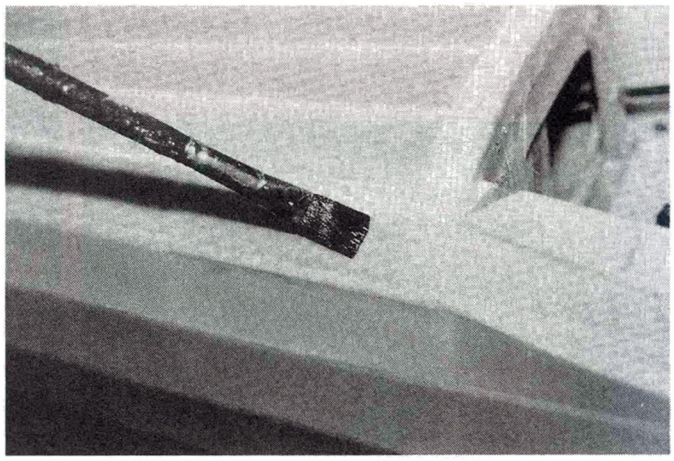
11 Pull the cloth taut toward the tail, and tack it down with more glue. Next, working around the edges, pull the cloth taut, and tack it into place with more adhesive on the corner stringers.



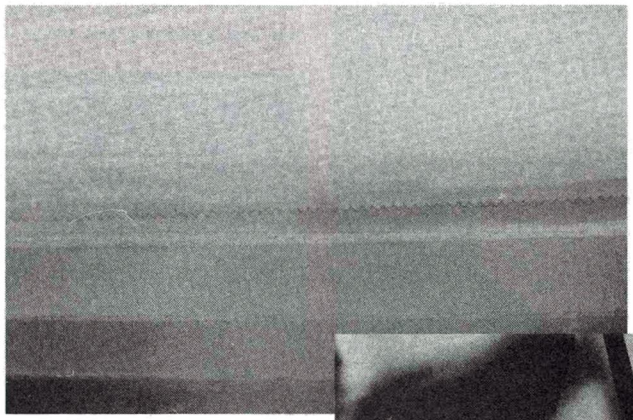
12 When the glue is dry, trim the cloth at the stringers as shown here. Again, note that all wrinkles have been removed before the cloth is heat-shrunk.



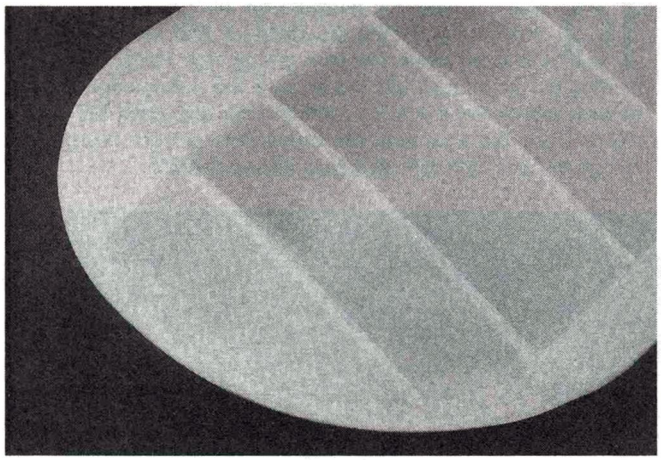
13 Next, apply cloth to the side of the fuselage, starting at the top corner stringer of the fuselage and going to the edge of the covered bottom. When you trim the edges, place a piece of cardboard under the side covering. This way, you can produce a clean, straight edge without cutting into the underlying cloth. Repeat the process for the other fuselage side, then cover the top of the fuselage (turtle deck).



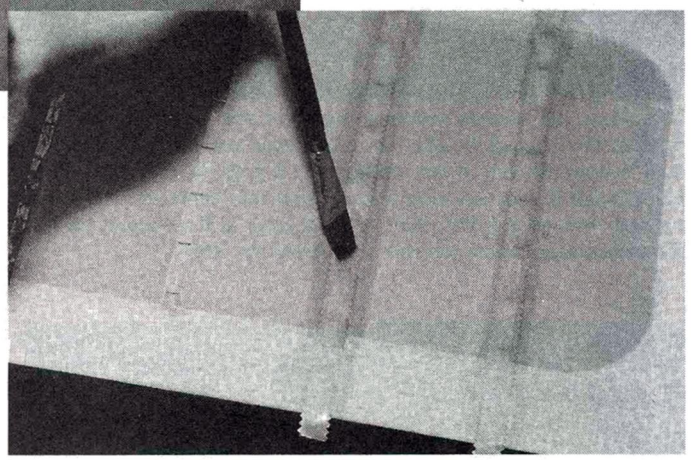
14 Once all the surfaces of the fuselage and tail parts have been covered and heat-shrunk, brush on a coat of Poly-Brush cloth sealant/primer. Poly-Brush dries very quickly, so apply it to small sections at a time, and avoid brushing over areas already coated. To strengthen and improve the appearance of the overlapping seams, apply ½-inch-wide Scale Stits pinked tape evenly over the seams. First, apply a coat of Poly-Brush over the seam, and press the tape down into the wet Poly-Brush. Apply another coat of Poly-Brush over the tape, and stipple the material into the tape so that there are no bubbles or voids under it.



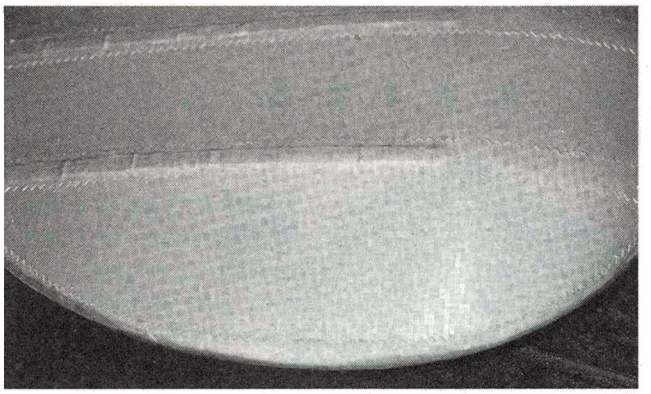
15 Here is a finished seam with pinked tape applied over it. After the Poly-Brush has dried (20 to 30 minutes), if there are any raised edges, you can run an iron (225 degrees F) over the edges to seal the tape. This will greatly reduce the amount of sanding you have to do later on.



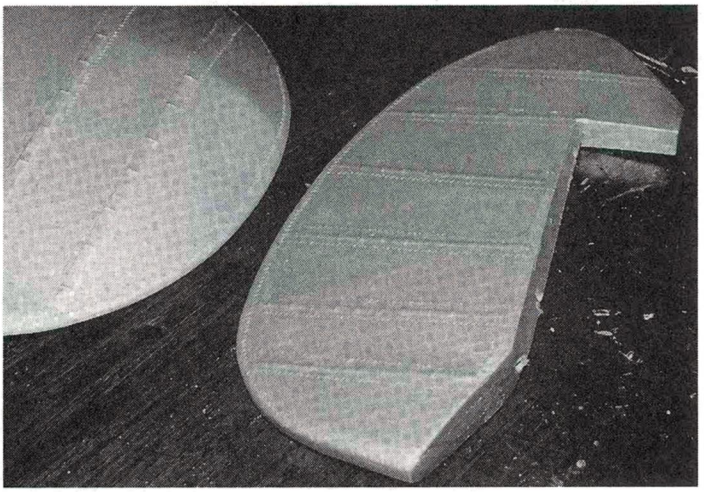
16 For the wing, apply Poly-Tak around the perimeter, and apply the bottom covering first. Wrap the edges of the cloth around the leading edge, tip and trailing edge, and work it down smooth with your fingers. Then apply the top covering, and again apply Poly-Tak along the underside of the edges, and press the cloth down for a smooth finish. Only after both the top and bottom surfaces have been covered and sealed around the edges should you heat-shrink the cloth.



17 Once the cloth has tightened, brush on a coat of Poly-Brush, and let it dry. Work in small sections until the entire wing has been sealed. Now, if you want to add rib stitching and tape detail, add it before you apply the pinked tape around the wing's perimeter. Press all the edges of the tape down with a covering iron as mentioned earlier. When all the parts of your model have been covered and sealed, apply another coat of Poly-Brush. If you wish, a third and final coat of Poly-Brush can be sprayed on, but I applied only two brushed coats. If you spray on the Poly-Brush, use about 40psi air pressure. Allow about an hour to dry.



18 Wipe down the parts with a tack cloth, and spray on a coat of Poly-Spray (I use an automotive touch-up spray gun). When the first coat is dry, go over all the parts with 320-grit sandpaper, and remove any specks of dust or rough spots. Use a very light touch because it is easy to cut into the cloth that has sharp edges beneath. Poly-Spray has an aluminum pigment (silver in color) that gives the cloth opacity and a uniform undercoat for the final color coat. Wipe it down with a tack cloth again, and spray on a second coat. Apply this coat "wet" so that the material will flow evenly. If the Poly-Spray or Poly-Brush dries too quickly, add about 30 percent Reducer (not MEK) to slow the drying process. Now set aside and let dry for a day or two.



19 Spray on two coats of Poly-Tone color coat, and let dry. Poly-Tone has a lot of pigment, covers very well and comes out of the can ready to shoot through your gun. Reducer has already been added, as have blush retarder (for humid conditions) and "fish-eye" eliminator (for small imperfections in the finish caused by surface impurities). Before you apply any masking tape for trim painting, allow a couple of hours to dry, and you've finished.

As you can see, there are a number of steps in covering a model with Scale Stits, but it all boils down to: (1) covering the model, (2) applying a sealant/primer, (3) spraying on a silver undercoat and (4) spraying the final color coat. That's it; it's simple and looks great. Best of all, you use the same materials as those used on full-size aircraft. You can't get any more scale than that.

**Addresses are listed alphabetically in the Index of Manufacturers on page 122.*

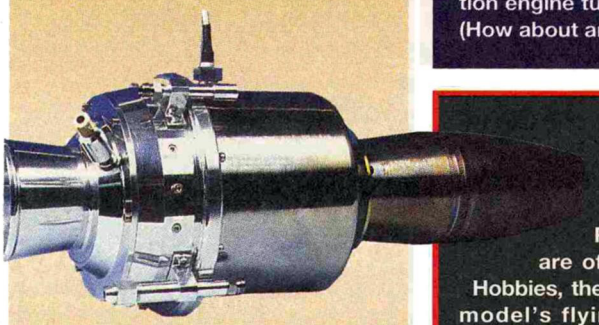
AirSCOOP

New products or people behind the scenes; my sources have been put on alert to get the scoop! In this column, you'll find new things that will, at times, cause consternation, and telepathic insults will probably be launched in my general direction! But who cares? It's you, the reader, who matters most! I spy for those who fly!

by CHRIS CHIANELLI

The Real World

I've been flying R/C for over 25 years, and only twice have I recaptured the excitement I felt the first few times I soloed. One time was when I began to fly off water; the other was seeing scale jets fly that were powered by true turbojet engines. If you've ever stood by a full-scale jet engine as it is being spooled up, you know the various sounds a jet makes. All of those sounds are present in model turbojets (in a scaled-down



version, of course). Engines such as this Sophia J450 go a step further and even smell "full-scale," because of the blend of kerosene and white gas they run on. I don't know if that's important to you, but it sure turns me on. I love the smell of JP4 in the morning!

This "state-of-the-art" J450 weighs 3.6 pounds, is 4.72 inches in diameter and 13.19 inches long, and it puts out an impressive 11 to 13 pounds of thrust, according to manufacturer's specs. For more information, or a videotape of the engine and operating models ($29.99 post-paid), contact Sophia USA, 1630 S. California Ave., Monrovia, CA 91016; (800) 359-6972; fax (818) 301-0298.

MY FAVORITE Cessna

In my opinion, the Cessnas with the most character are the 195 and the venerable Agwagon. Details are few at this time, but the boys at Byron's giant-scale "skunkworks" have informed me that the Cessna 195 project is on schedule. This 22.5-percent-scale model has a 97.5-inch wingspan and an area of 1,570 square inches. Reports state that the 22.5-pound prototype, powered by a Mustang 50 ignition engine turning a 20x10 prop, performs impressively. Stay tuned for more details. (How about an Agwagon, guys?!?)

IMAA ARF CUB

Hangar 9 announces its Ultra Series, IMAA-legal, 80-inch-wingspan ARF Cub. The Hangar 9 Cub is an all-wood built-up frame covered with UltraCote. Reportedly, the construction and covering are of very high quality. According to Horizon Hobbies, the construction is so well-executed that the model's flying weight is estimated to be 6.5 to 7 pounds—excellent for a plane of this size—and it requires only a .40 to .45 2-stroke or .45 to .60 4-stroke for good performance. Here

are some examples of the kit's attention to detail: the landing gear is a scale, functioning, bungee-type; the scale balloon tires have the Cub logo hubcap; and the N-numbers and fuselage black lightning bolt are in place. Even the wing struts are pre-covered! Here's the best part: the suggested retail price is $259.95.

Also new from Horizon is the Webra Speed .40 Sport, which features a bead-blasted finish and diamond-finish head, dual ball bearings and true ABC piston/liner assembly. After break-in, Horizon's test crew obtained 14,200rpm on an APC 10x6 prop with muffler and a reliable idle of 2,100rpm with the TNII carb. Suggested retail price is $139.95. Contact Horizon Hobby Distributors Inc., 4105 Fieldstone Rd., Champaign, IL 61821; (217) 335-9511.

MOTHRA!

Big news! Aero Dynamics recently announced plans to produce its very large giant-scale design of the legendary Tiger Moth. This 40-percent rendition will have a 120-inch wingspan! The amount of interest in the giant Moth from both American and foreign pilots prompted the company to kit the design, which first flew nearly three years ago. Standard and "super-kit" versions are planned. While both kits will offer high-quality components such as light-fiberglass cowl and upper-wing fuel-tank center section, the super-kit will include many other scale extras, such as exact-scale flying wires. Rumor has it that when the 40-percent version has been launched, Aero Dynamics will begin work on a 1/3-scale (100-inch wingspan) version. According to the manufacturer, flight tests of the prototype show that the giant moth possesses gentle, yet scale-like, flight characteristics. Delivery is scheduled for mid-December. For more information, contact Aero Dynamics, 3045 Pinchom Creek Dr., Rescue, CA 95672; (916) 672-0607.

A DRONING DREAM COME TRUE

How many of you have ever daydreamed about doing a low pass with a P-38 only to have that twin-engine-droning dream interrupted by reality—the reality that you must build almost three fuselages? Oh, no! Well, our friend Bill Price of G&P Sales has spent a year developing his P-38 with a fiberglass fuselage and nacelle/boom structures replete with scale panel lines, so the hard part has been done for you.

The fuselage, nacelle/booms and center section are one unit, and the outer wing panels plug in slightly outboard of the nacelles. All wing and stab outlines have been embossed on the fuselage and nacelle sides to ensure correct alignment. The 88-inch wing is foam-core while the rudders, stab and elevators are 1/4-inch-thick balsa. Here's a trick feature: the cockpit bubble is glued on from the inside, leaving the canopy fiberglass frames outside. The kit is designed to be built quickly and reward the Sunday flier with one of the coolest warbirds ever. Although no price has been set yet, it's my understanding that keeping the price down is foremost on G&P's agenda. Recommended engines are .61 2-strokes and .91 4-strokes. For more information, contact G&P Sales, 455 Sunset Dr., Angwin, CA 94508; (707) 965-1216. Ask for Mr. Bill.

Micro Masterpiece

In 1989, Mr. Gasparin of Prague, Czechoslovakia, earned a place in the "Guinness Book of Records" for building the world's smallest CO_2 engine. Now, he has designed and constructed this incredibly detailed V12, which measures approximately 12x63mm. According to its U.S. distributor, Hobby Lobby Intl., it runs as good as it looks. Each engine comes ready to run and with a wooden display stand, spare-parts kit and fuel tank. Gasparin's motors are used to power small-scale free-flight and tiny R/C model airplanes, but they're equally intriguing as operational display pieces. These engines are often given as awards and retirement gifts in the full-scale aircraft industry, and could quite possibly become collectibles and increase in value. Other Gasparin engine configurations are: 4-cylinder box; 5-, 7- and 9-cylinder rotary radial, 6-cylinder in-line, 8-cylinder V8 and 18-cylinder double-row radial. Each special production engine has a serial number and comes with a date-of-manufacture certificate and Mr. Gasparin's personal (and tiny!) signature. For more information, contact Hobby Lobby Intl., 5614 Franklin Pike Cir., Brentwood, TN 37027; (615) 373-1444; fax (615) 377-6948.

Beautiful—Beautiful

The colorful scheme of Global's Raven will look even more beautiful on this new, 82-inch-wingspan IMAA-legal version. In response to consumer requests (me included) for a bigger version of its very popular .60 Raven, Global Quality Kits will make it official and start production of this new 1/4-scale Raven. The giant Raven features many custom scale parts, such as: Raven spinner, wheel pants and canopy and fiberglass cowl. Covered with iron-on film, the Raven reportedly has a flying weight of only 12 to 13 pounds. Vertical performance should be excellent with appropriate power. No price or release dates are available as yet.

If you're wondering about the model holder with the beautiful smile, it's Global's art director Sandi Anderson. For more information—about the Raven that is—contact Hobby Shack, 18480 Bandilier Cir., Fountain Valley, CA 92728-8610; (714) 964-0827; fax (714) 962-6452.

Great Extra

The extremely popular German Extra 300S is now offered in an affordable all-wood kit for .40 engines by Great Planes Model Manufacturers. In the Great Planes tradition, construction features precise, interlocking, die-cut wooden parts and one-piece, lite-ply fuselage sides. The wing's leading and trailing edges come shaped and feature a sturdy, yet light D-tube design. The kit includes an extensive hardware package with wire-in-tube pushrods, an adjustable engine mount, beefy Dural landing gear, a two-piece ABS cowl and ABS wheel pants. According to Great Planes, the fully symmetrical wing makes this Extra 300S very maneuverable yet easy to fly for the experienced sport pilot. Contact Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-0008.

NEXUS 30

Kyosho's new Nexus is a more sophisticated, "next generation" entry-level machine that features engineering advancements usually found on competition helicopters. Also, according to distributor Great Planes, the novice should find its flight stability, easy maintenance and simplicity of design very attractive.

Some of Nexus' technological advances are a one-piece molded rotor head for increased durability, lower parts count and a solid-axle seesaw head for stable hovering and smoother forward flight. Tail-rotor improvements include the addition of more ball bearings in the gearbox, a Concept

60 tail rotor and additional tail-boom supports for greater rigidity. Available in a full kit or assembled with an O.S. .32 F-H engine mounted. Rumor has it a 4-stroke version is in the works. Contact Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-0008.

MODEL AIRPLANE NEWS

FIELD & BENCH REVIEW

A whirlwind of fun and performance

EVEN IF they tried, I doubt that Global Hobby Distributors* could have given this aircraft a better name. "Tornado" suits this model perfectly; it describes how it flies and how it's built. This is possibly the best-built ARF that I have so far constructed, and it's quick to build, too! It went from the box to being flight-ready in the time it took me to watch game four of the NBA finals and three episodes of "Star Trek."

GLOBAL Tornado ARF

by CRAIG TRACHTEN

With its nice color scheme, the Tornado is quite visible as it cruises through the sky. It's easy to tell upright from inverted because the bottom is orange.

CONSTRUCTION

• **Wing.** The wing panels arrive joined and completely covered, and the ailerons are installed. To complete the wing, I had only to glue three pieces of balsa and one piece of plywood together for the servo mount. Epoxy the mount into place, screw in the servo, add two control rods, and the wing is finished! It doesn't get any easier than this. The fuselage and wing are matched at the factory.

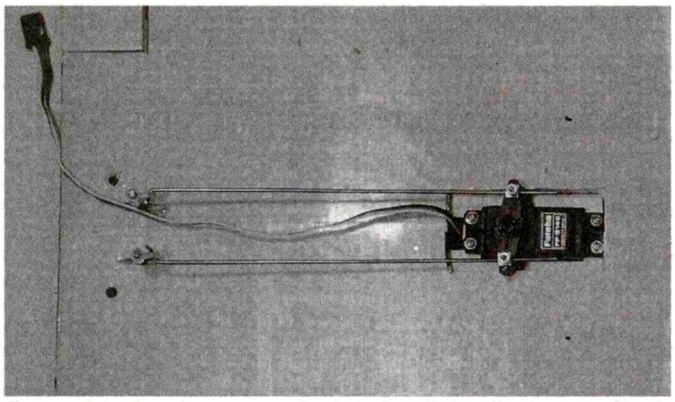
• **Empennage.** The horizontal and vertical stabilizers are easy to prepare for installation. Take them out of the box, attach the control horns, and that's it! As with the wing, the control surfaces were already installed. The builder has to install only the bottom hinge of the rudder. For the horizontal stabilizer, trim away the covering over the pre-cut slot and trim some off the horizontal stabilizer itself, and you're almost ready for the epoxy.

One construction step was omitted. On page 10, between steps 2 and 3, there should be a step that tells the builder to remove, with a razor saw, a section of the rear building block. With this block removed, epoxy the stabs into place, and the empennage is complete. Check the stabs' alignments as the epoxy dries.

• **Fuselage/engine.** Completing the fuselage construction and engine mount was almost as easy. The fuelproofed firewall has all the mounting holes pre-drilled. Install the nose gear with four nuts and bolts and two setscrews. Glue in the steering-control-rod guide.

The two-piece engine mount is made of a composite material, and it came drilled to accept any of the Magnum XL-.40 to .53 engines (distributed by Global). If you want to install a different engine, swap the engine-mount arms, left to right, drill your own holes, and you're in business. Four nuts and bolts for the mount and four for the engine; this step is almost finished. Would you believe that they actually ask you to drill a 5/32-inch hole for the throttle-control-rod guide! How dare they!

The one-piece servo tray has to be epoxied into place, and the main landing gear is fastened by four screws.

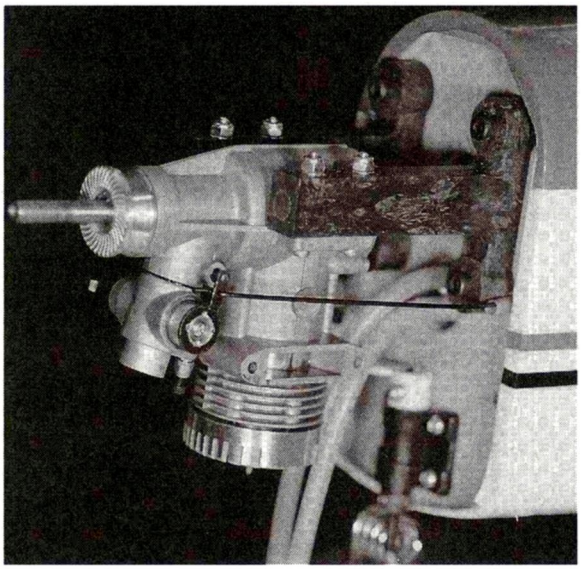


To complete the wing, you need only to install the aileron servo. Check the factory-installed aileron hinges to make sure they're secure.

• **Radio installation.** I used a Futaba* 6VA with four standard S148 servos, but I used a 1000mAh receiver pack for more battery capacity. The control-rod guides for the elevator and rudder were—you guessed it!—factory installed! Slide in the pushrod until you see where it will exit, cut the covering with a hobby knife, and your pushrod is in place. The servos are mounted in much the same way as they always are: just screw them down.

When it was time to install the clevis, I was surprised because I had never seen this design before. After centering the servos and attaching the Z-bend end of the pushrod to the servo arm, cut off the excess rod at the control-horn end. The aluminum clevis is attached to the control horn with a screw and to the control rod

• **Cowl.** It probably took me longer to fit and cut the cowl than it took me to build the plane to this point. It was the only part of the construction that required undivided attention, and it's a process of "on again, off again, on again...." Every time you trim, be careful and neat. Your openings will end up oversize, but that's OK. The rule of thumb is that you need twice as much vent area as intake area. The oversize opening will satisfy this criteria without your having to cut additional vents. The cowl shape lent itself to being trimmed—"Flying Tiger-ish"—so I opened a mouth for intake and eyes for vents. The cowl is made of thin-wall fiberglass that's very easy to trim, but don't forget to sand away the loose fibers.



It's easy to install the Magnum XL-.46: bolt it in and hook it up.

SPECIFICATIONS

Model name: Tornado

Manufacturer: Global Hobby Distributors

Model type: ARF advanced trainer

Length: 53 in.

Wingspan: 56 in.

Wing area: 602 sq. in.

Wing loading: 25.12 oz. per sq. ft.

Weight: 6lb., 9 oz. (105 oz.)

Airfoil: symmetrical

Engine req'd: . 40 to .53 2-stroke

Engine used: Magnum XL-.46

Props: APC 11x6

No. of channels req'd: 4 (throttle, elevator, rudder, ailerons)

Radio used: Futaba 6VA

List price: $249.99

Features: built, covered and all control surfaces installed at the factory; complete hardware package included.

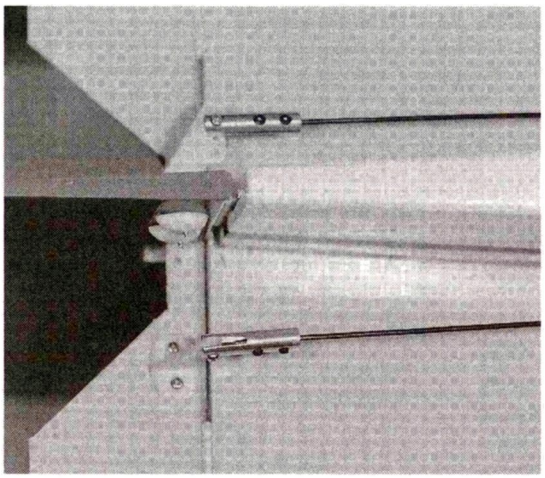
Comments: except for one minor omission, the instruction manual is very builder-friendly. This great advanced trainer is fun to fly. Don't let its "trainer" designation keep you away; it will fly like a sport pattern plane.

Hits

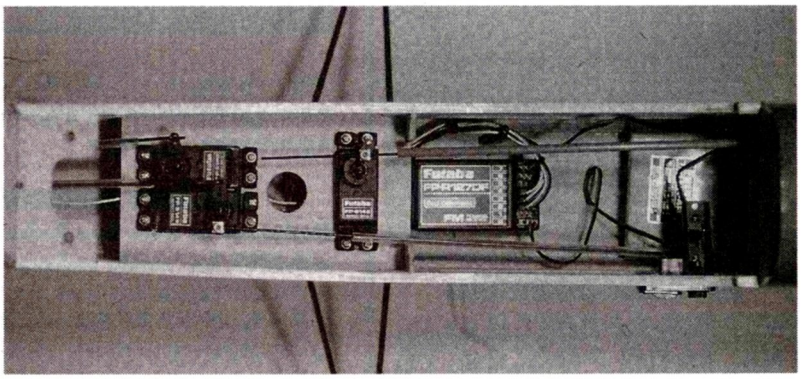
- Well-built, pre-assembled parts.
- Excellent factory covering.
- Extremely fast construction.
- Excellent manual.
- One-piece wing.
- Great performance.

Misses

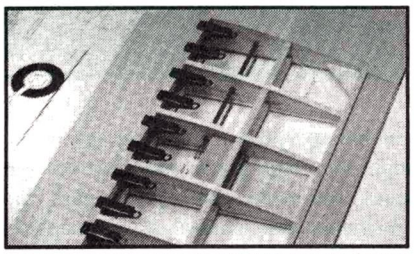
- Had to use a Higley* heavy hub and 3 oz. of lead to achieve proper CG.

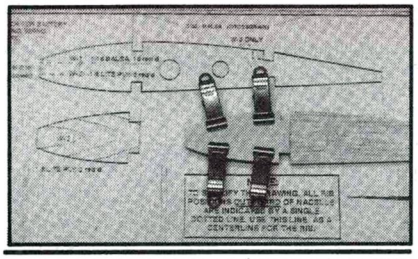


Two setscrews allow the metal pushrod clevises to be adjusted while they're attached to the pushrod. A metal screw connects the clevis to the horn. Metal clevises are much stronger than nylon ones.



This radio installation is exactly as described in the manual. If you can, move the battery and receiver forward to avoid having to add nose weight.





FLIGHT PERFORMANCE

by ROGER POST JR.

A quick check of control-surface movements and radio range showed everything was in order. We started the Magnum XL-.46, tuned it to our liking and did some taxi tests. The Magnum engine runs smoothly and is quite powerful, so when taxiing, control the throttle setting because the Tornado does move quickly.

• Takeoff and landing

Our Tornado used 150 feet of runway to become airborne. Right rudder was needed for the takeoff run and climb-out. Taking off was easy, but make sure you have enough runway in front of the plane to do it. For level flight, this Tornado needed quite a bit of up-trim, but it didn't need aileron or rudder trim. It's fast and slick and handles very well in the air—much like a sport pattern ship.

Landing requires airspeed management. To get the Tornado to slow down enough for a smooth landing, I had to lower the throttle stick, trim almost to the engine shutdown point, add some up-trim and then pitch the nose up. This took a couple of practice approaches to perfect. Our one deadstick landing proved the Tornado glides extremely well.

• Low-speed performance

When the inputs I just mentioned have been dialed in, the Tornado will fly slowly, but it's not as slow as a Cub. The rudder is very effective through the power-off stall, and the stall is very gentle with a slight break to the left. Recovery consisted of adding a little power and some right rudder to stop the left break. The elevator stick was pulled all the way back, and it still took a while for the plane to stall.

• High-speed performance

This plane is fast, and it grooves very well in the air. For straight and level flight, it needed up-trim, so after the first flight, I landed it and reworked the elevator setting, re-trimming it mechanically so I'd be able to reset the elevator trim to the center. Initiating a power-on stall required a reduction of throttle to ⅔ and full up-elevator. During the stall, the plane had a slightly sharper break than during the power-off stall, and it fell off to the left, too. Recovery required the addition of right rudder and relaxation of the elevator backpressure. Estimated top speed was 60 to 65mph.

• Aerobatics

This plane flies like a sport pattern plane. Loops were big with very little right-rudder correction needed for the climb (contrary to what was needed for takeoff and climb-out). It rolled quite axially both left and right, and the roll rate was fairly quick. Snap-rolls—inside or outside, to the left or right—were quite violent, but the plane held together. With just rudder and elevator input, it spun to the left, but to initiate a right-hand spin, it needed some aileron input as well as rudder and elevator input. A release of the sticks and a little opposite rudder stopped the rotation. Inverted flight required very little forward stick; at one point, I added some down-trim and flew the plane inverted hands-off. In this orientation, it's rock-solid and very stable. Knife-edge flight required more rudder throw than was initially set up on the model. A mechanical reworking of the rudder throw helped with sustaining knife-edge flight.

Combinations of these maneuvers produced effortless pattern-type flight. If you want to get into this type of flying, check out this plane. It's a great flier.

with two setscrews. I like this! The nose wheel and throttle are attached with the traditional quick connectors.

BUILDER'S THOUGHTS

Because of my work, I am limited to ARFs and ARCs that I usually customize to satisfy my creative side. It took less time to assemble this Global Tornado intermediate/advanced trainer than it usually takes to put together a "first plane" trainer—less than any other ARF I've put together. If you are looking for a good design that's well-built, quick to get into the air and flies...well...like a tornado, this one's for you!

**Addresses are listed alphabetically in the Index of Manufacturers on page 122.*

Pilot PROJECTS

A LOOK AT WHAT OUR READERS ARE DOING

SEND IN YOUR SNAPSHOTS

Model Airplane News is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable. We receive so many photographs that we are unable to return them.

All photos used in this section will be eligible for a grand prize of $500, to be awarded at the end of 1996. The winner will be chosen from all entries published, so get a photo or two, plus a brief description, and send them in!

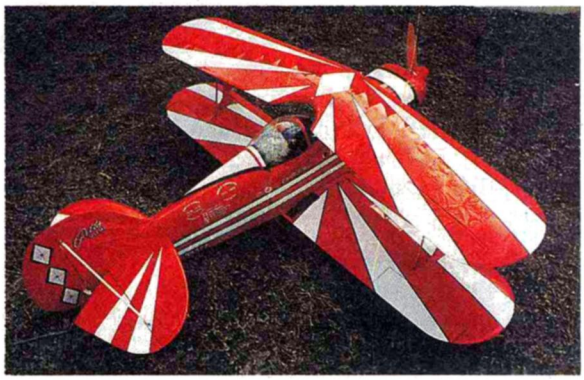
Send those pictures to: Pilot Projects, Model Airplane News, 251 Danbury Rd., Wilton, CT 06897-3035.

FROM ACROSS THE POND

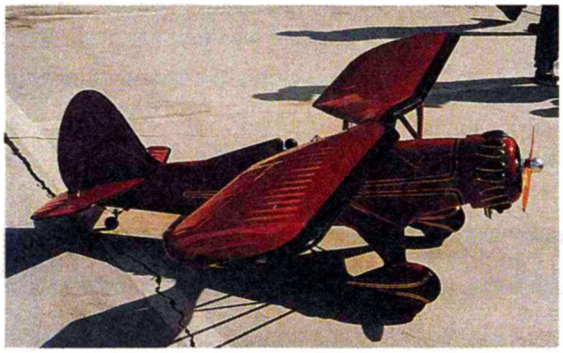
This photo of Jens Weigert and his Bud Nosen "Mr. Mulligan" came all the way from Osnabruck, Germany. It's covered with Sig Coverall and urethane and weighs 19 pounds. A SuperTigre 3000 swinging a 21x12 Menz prop hauls the plane around, and Jens uses FAI fuel that doesn't contain nitro.

FIRST ATTEMPT

Jerry L. Pond of Sedgwick, KS, took *Model Airplane News* plans FSP04742 by Jerry Nelson, enlarged them and came up with a 70-inch-span Pitts Special. The model, which took 1½ years to complete, is powered by a SuperTigre 3000, and it uses a Simple Smoke System with a Slimline smoke muffler. For the pilot, Jerry used a doll from Wal-Mart, and the decals and sliding canopy are from Byron Originals.



The outstanding color scheme is all MonoKote. This was Jerry's first large R/C plane—a fine-looking aircraft!



SCALED TO PERFECTION

This gorgeous 1932 Stinson Model O was scratch-built by Carl Hansen of Simi, CA. It has a 9-foot wingspan, weighs 40 pounds and is powered by a Zenoah G-62. Carl must have won many scale contests with this one!

CHIP AND DALE

Robert H. Scheppele Jr. of Manchester, MO, has made some innovative modifications to a Goldberg Chipmunk. It seems that the model's DNA became a little twisted, but the results are nice-looking. Bob said the first flight of the "Twin Chipmunk" took place last June and, after about 75 to 100 feet of ground roll, the plane was airborne. Powered by two O.S. 70 Surpasses, the plane's Airtronics radio uses five channels with nine servos. The 13-pound craft has two 12x8 Master Airscrew props, and it's covered with Ultracote and 21st Century paints.

BATMAN BEWARE!

This Goldberg Tiger II, built by Jason Wentz of Phoenix, AZ, is a real eye-catcher. It's powered by a SuperTigre .46 and covered with Top Flite MonoKote and Goldberg Ultracote. The Joker pilot figure came from a toy store. Jason says the plane is an absolute delight to fly and very easy to land. He's currently working on a Top Flite Gold Edition P-40E.

BRAZILIAN CHAMPION

Aramis Silveira of Curitiba, Brazil, is one of aeromodeling's unsung heroes. He has done a lot for the hobby in his native Brazil, and he's well-respected by his fellow modelers. He is also a modest man, so his friend, Wilson Roque, sent us a picture of Aramis and the Ohio R/C Models Extra 300 that he built. Aramis, a 50-year veteran of R/C, has been the champion pattern flier in his country on several occasions.

"I SAID BUD LIGHT"

Ron J. Malinowski of Spring, TX, built this Bobby Bradford kit 1/3-scale Bud Light Laser 200. The plane weighs 22 pounds, and it has a 50-ounce smoke system. It's powered by a 4.4 Husky Challenger that swings a 22x12 prop, and Ron tells us that this combination provides unlimited vertical. Everything is big in Texas, including Ron's plane. It looks beautiful! We're sure that it flies beautifully, too.

THE RAZOR'S EDGE

It took George P. Brankman of Hoosick Falls, NY, two years to scratch-build this beautiful 1/3-scale Fokker D-VIII. Every-thing is handmade, including the machine guns, and it's powered by a Zenoah G-62. The D-VIII has a smoke system, a gyro on the rudder and markings that authentically reproduce the full-scale replica Fokker D-VIII that's in the Champlin Air Museum in Arizona. Also, the lozenge camouflage markings were hand-painted using Folk Art acrylic colors. Nice job, George!

"BUD LOOP"

A friend sent in this photo of Bud Loop of Sacramento, CA, and his Top Flite AT-6. It's powered by a SuperTigre .75 and driven by an Airtronics Vanguard radio. The "decorations" on the side were hand-painted. Bud has raced this plane in the S.W.R.A. races. Bank and yank!

HIS "D ZYNE"

Danny Braun of Pulaski, WI, designed this twin and named it "My D Zyne." It's made of balsa, plywood and spruce and covered with MonoKote. The wingspan is 96 inches, and the length is 78 inches. An aluminum tube runs through the center section, and the outer panels plug into the tube. In the outboard panel are 5/8-inch, wooden, antirotation dowels. Two Tower .40s fly it around, and eight servos drive the control surfaces and retracts. Danny made his own retracts, which were based on a Hobbico design, and he scaled them up one and a half times. There's a small video camera in the fuselage section, and Danny says his D Zyne flies like a trainer. Nice job!

MODEL AIRPLANE NEWS
HOW TO

Maximize Linkage and Computer Radio Setup

by MIKE McCONVILLE

COMPUTER RADIOS are filled with bells and whistles that you'll never have any use for—right? Wrong! Their features simplify and speed many formerly difficult setup and trimming tasks and allow us to do things with our models that we never before thought possible. And their relatively low prices mean that most modelers now own at least one (or soon will). When using a computer radio to set up your airplane for optimum performance, to get the most out of the equipment, you must follow the specified mechanical methods of servo-linkage setup.

This month, I look at two of the basic, but most useful functions—adjustable-travel volume (ATV) and programmable mixing (PMix).

Understanding programmable mixing and adjustable travel volume

ADJUSTABLE TRAVEL VOLUME

Basically, ATV is an end-point adjustment. In other words, by adjusting the ATV to greater or less than 100 percent, the servo travel on that channel can be increased or reduced. Most radios allow independent ATV adjustment in each direction of the stick deflection. This simple feature makes setting up the desired control throws a snap. But—there's always a "but," isn't there?—if we use this feature to limit servo travel, we also decrease servo resolution.

A simple example:

We finish a new model and make the linkages to connect the control surfaces to the servos. Then we turn on the radio to set the control-surface throws as specified in the manufacturer's instructions (we all do this, right?), and we find that the elevator has too much movement, or is even deflected so far that it binds the servo.

• **The wrong thing to do.** Pull up the trusty old ATV screen on the transmitter and reduce the elevator ATV percentage until the control-surface movement is what you want. This is only OK if it takes just a few percentage points to get the proper result; with a control-surface throw, I try not to go below 90-percent ATV.

As servo ATV is reduced, total servo travel is obviously reduced. If you watch very closely, you'll see that a servo actually moves in very small steps. Total travel contains a given number of steps from one throw extreme to the other. When servo travel is limited, the number of steps between the extremes is decreased, and the plane's control movements aren't as smooth. (It will be "jumpy.")

• **The right thing to do.** First, while maintaining 100-percent ATV, adjust the linkages to mechanically reduce the control-surface movement and bring it as close to where you want it as possible. Then use ATV to tweak the throw to the amount you want. If possible, mechanically adjust the control throw to slightly less than you want and increase ATV above 100 percent until the throw is correct. Figures 1 and 2 show two setups that will give the same total control-surface throw; but the setup shown in Figure 1 will be more precise because it optimizes servo resolution, and as a result, the model will fly better. By following this setup, we are sure to get the most out of our servos.

PROGRAMMABLE MIXING

As I've discussed in previous articles, there are many advantages to using dual servos for aileron and/or elevator control. One method is to use a dual or Y-connector to operate each servo. A better solution is to use two channels to ensure like movement of each control surface. By using PMix and ATV together, we can use two channels and achieve almost exactly the same movement in each surface and thus eliminate any slight differences in servo movement. With any dual aileron or elevator servo setup, you must, of course, use the same type of servo on each surface.

An example:

Let's use a typical dual-elevator-servo setup. First, with a linkage, we connect each elevator half to its respective servo. Plug one servo into the elevator channel in the receiver and the other into an unused auxiliary channel. If the transmitter allows (the Futaba* 8UAF, 8UAP and 9ZAP do), set the auxiliary channel to NULL so that it can't be moved with a transmitter knob or lever. If this is not possible with your transmitter, you can still achieve this setup; just

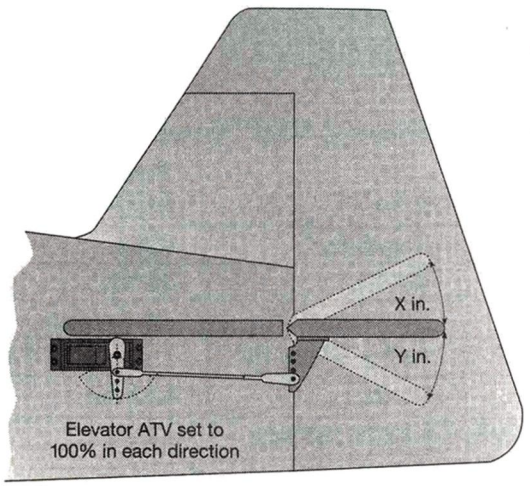


Figure 1

Both setups give the same total control-surface movements, but by mechanically reducing the throw in the setup shown in Figure 1, you increase servo travel so that the resolution is greater and the airplane responds more smoothly and precisely.

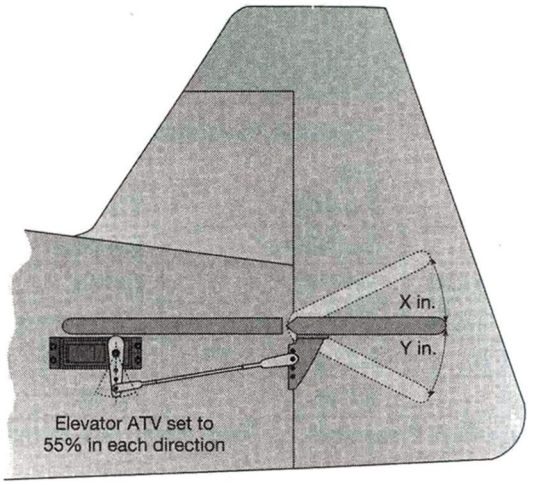


Figure 2

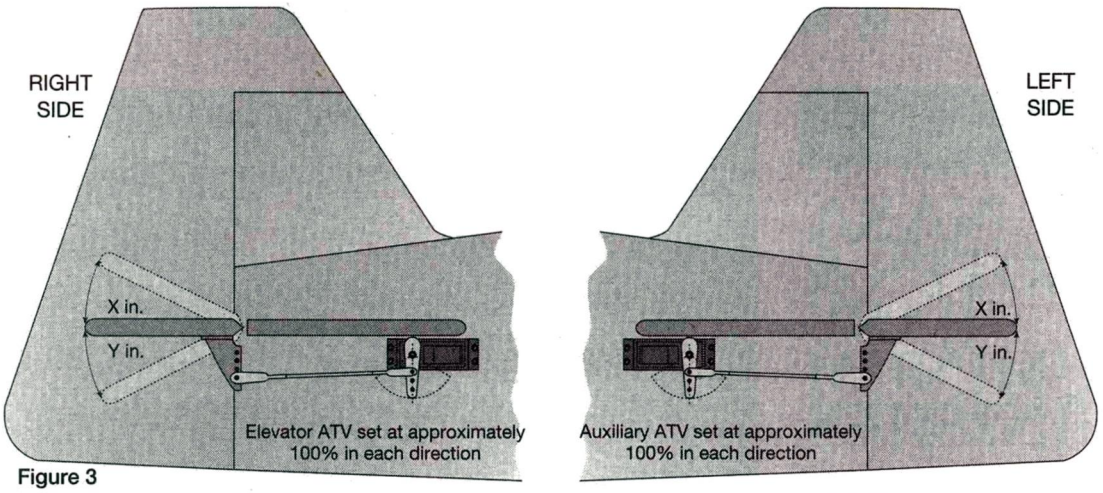


Figure 3

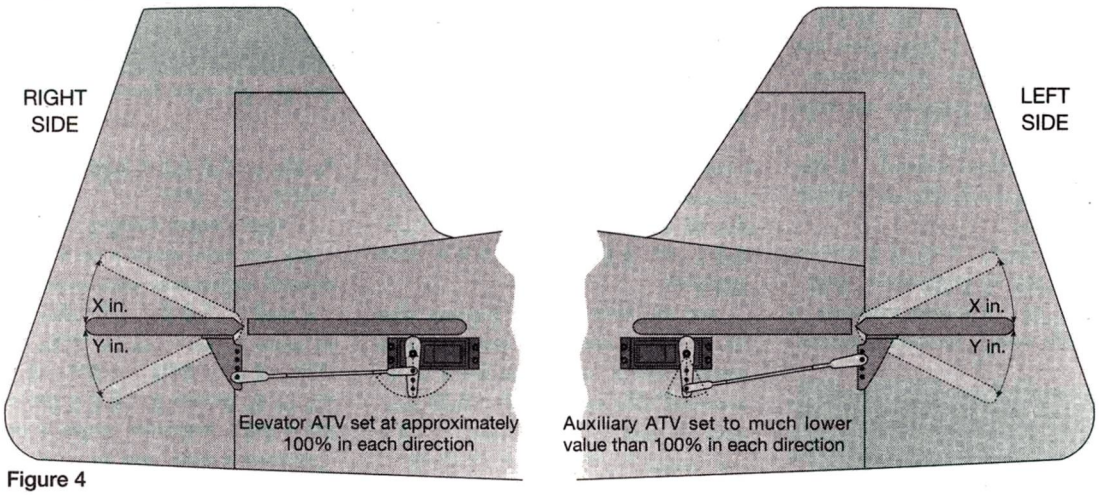


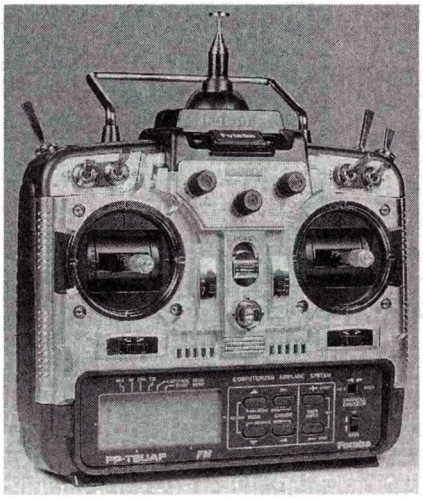
Figure 4

At full deflection, both setups give the same control-surface movements, but while the example shown in Figure 3 has the same mechanical setup and very close ATV values on each side, the setup shown in Figure 4 has more mechanical movement and a much lower ATV value on the left side than on the right. In this example, at any point less than full stick, each elevator has a different amount of resolution. The result is an airplane that tracks poorly.

be sure to center the knob that adjusts the auxiliary channel, and then be careful not to bump it out of that position. Next, go to the PMix screen and, on one of the available mixes, set the elevator channel as the master and the auxiliary channel as the slave. Set the mix so that it can't be turned off with a switch, and set the mix percentages to 100 percent. If either of the elevators moves in the wrong direction, use the servo-reversing function to change the incorrect servo. Now we have everything moving, follow the mechanical method described earlier to correctly set the throw of the elevator half that is plugged into the elevator channel.

We're halfway there! Set the second elevator-half linkage to exactly the same position as the first, i.e., to the same distance out on the horn and in the same hole in the servo arm. Also be sure that the servo arms are set to the same positions on the servo-output shaft. Measure the throws on one elevator half, and use the ATV for the auxiliary channel to get the same throws as the other half. The ATV settings for the elevator and auxiliary channels aren't likely to be exactly the same, but they should be close. If they aren't, double-check the PMix screen to be sure the mix rates are set at 100 percent, and check the linkages to be sure they've been adjusted to exactly the same positions.

If you follow this method, the elevator halves should have the same amount of total throw throughout the control-stick movement. Figures 3 and 4 show two setups that will give the same throw at maximum stick deflection. The setup shown in Figure 3 will have equal throw movements throughout; the one shown in Figure 4 will have different throws on each elevator half at any stick deflection less than full because the side with less than 100-percent ATV has a coarse resolution. This will give you an airplane that tends to roll out of loops and track poorly.



The Futaba FP-T8UAF is one of the many versatile computer radios modelers use. To maximize your model's performance, the radio and the mechanical linkage must be set up properly.

There are many ways to use computer-radio features; they allow us to dial in or out almost any tendency we want or don't want in an airplane. If used incorrectly though, the benefits can quickly be offset by user-generated shortcomings in our setups. Next time, I'll move on to how you can use a computer radio to customize your airplane's feel.

**Addresses are listed alphabetically in the Index of Manufacturers on page 122 .*

About the author

Mike's father, Jim, has been involved with R/C since the early days of escapement, so it's only natural that Mike followed in his footsteps. Mike says, "I have been involved in R/C all my life and in almost every aspect of R/C aviation, including pattern, racing, sailplanes and helicopters."

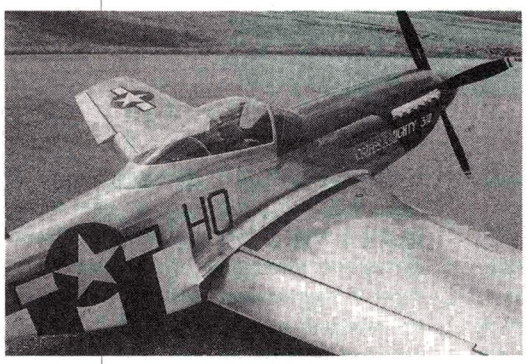
by GEORGE LEU

NASA NOTES & EASY ALUMINUM FINISHES

This Pica Mustang is the work of Mariano Alfafara, who took third place in Military Scale at the '96 Toledo Show.

IN THE AUGUST issue, I discussed riveting details and, this month, I wanted to discuss flush-rivet and screw-detail techniques. Unfortunately, my hectic business schedule has kept me away from the shop, so I must postpone that discussion. Instead, I'll discuss reproducing an aluminum finish on your scale model.

Over the years, I've seen many techniques used by modelers to simulate aluminum. Different methods—from simply using aluminum-colored paint to actually installing thin aluminum sheets—have been tried with various degrees of success. As with any covering method, however, reproducing an aluminum finish requires a lot of preparation. For a great-looking final finish, the underlying surface must be as smooth and as perfect as possible. Is there an easy way to achieve that alclad look? Yes, there is!



Mariano's P-51 "Cripes A'Mighty 3rd" is beautifully finished with Skinny Dip.

SKINNY DIP

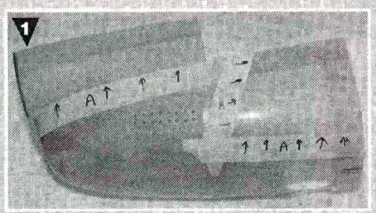
No, it's not a new Olympic diving competition; Skinny Dip is a new product from Innovative Model Products* (IMP) that quickly produces an aluminum look on your model's skin. It consists of an adhesive that's sprayed onto the skin and a dry aluminum-colored powder that's rubbed on the treated surface after the adhesive has dried. An application cloth is also included.

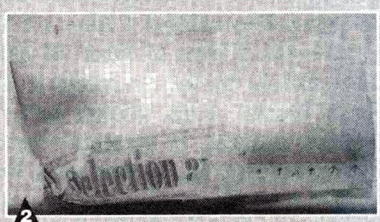
For the best results, Skinny Dip should be applied to a sanded, primed surface. (As a test, I applied it to an unprimed fiberglass cowl, which produced a good-looking finish, but it's best to prime your model first.) First, mask off each panel; then apply Skinny Dip to each section. (Don't apply it to the entire wing or fuselage.) Remove the tape, and repeat the process. It's easy!

I used a small Badger* airbrush to apply the first spray coat. The silver-colored adhesive is heat-activated, and it's used to bind the aluminum powder to your model. The spray is almost clear when it dries (it takes about 10 minutes). When the first coat is dry, put some aluminum powder on the application cloth and, moving in one direction only, rub the powder onto the unmasked area between the taped edges. To speed up the process, mask

ANYONE FOR A SKINNY DIP?

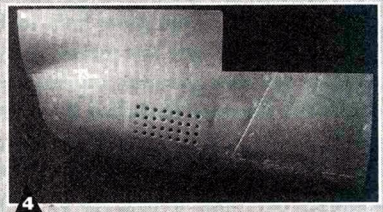
The fiberglass cowl for a P-51 has been masked off for the application of the Skinny Dip finish.





I masked off the other areas and sprayed on the heat-activated adhesive with an airbrush.

When the aluminum powder is rubbed over the unmasked areas, it bonds with the adhesive.



The completed cowl with its aluminum finish.

off several non-adjacent areas, and apply Skinny Dip to all of them. First, draw all the panel lines so you can work your way around the model until all the panels have been treated. This quick and easy process produces authentic-looking aluminum finishes for models such as the P-51 Mustang and the AT-6 Texan.

MARIANO'S MUSTANG

I've included a couple of photos of Mariano Alfafara's Pica* P-51D Mustang, which is finished with Skinny Dip. Mariano's "Cripes A'Mighty 3rd" took third place in Military Scale at the '96 Toledo Show. The all-wood kit has an 89-inch span, and it's powered by a Moki* 1.8 glow engine. The finishing technique consists of Super Coverite* fabric painted with Sig* nitrate dope for a base. Mariano sprayed on Du Pont 30 primer and HobbyPoxy* paint; then he applied the Skinny Dip. The markings are rub-on dry transfers. If you saw this model at Toledo, then you know how beautiful it is. The photos really don't do it justice.

Jeff Foley and his assistant prepare Jeff's Japanese A6M3 Zero for another flight. Built from a Dave Platt Models kit, this all-wood model is a great choice for those who want to get serious about scale competition.

NASA

The National Association of Scale Aeromodelers is a special-interest group within the Academy of Model Aeronautics. It was started in 1977 to encourage, promote and advance all phases of scale aeromodeling in the U.S., regardless of model size, power, or control, i.e., R/C, U-control or rubber-powered free flight. The organization encourages its members to form scale modeling clubs, fly in scale competitions, train scale judges and exchange scale data.

Bob Underwood is NASA's president, and Stan Alexander is the vice president. Over the years, they have had a positive influence on the development of scale modeling. Their proactive leadership encourages scale modelers to unite, so if you're interested in scale modeling, please get involved with NASA.

As a member of NASA (it costs only $8 a year), you'll receive the Scale Data Source List (a comprehensive, up-to-date list of scale material available in the U.S.), a subscription to the bimonthly newsletter "Replica," a 3-inch NASA decal, an embroidered patch and a membership card. Support our scale fraternity, and send your money to Bert Dugan, NASA Secretary/Treasurer, 1109 Phyllis Dr., Clio, MI 48420.

DAVE PLATT MODELS

In an earlier column, I mentioned that I was building a Dave Platt* Japanese Zero. Although I just started it last winter, I bought it from Dave about five years ago along with the landing gear, the pilot figure and the engine accessories. (Am I the world's slowest builder, or what?) Anyway, this all-wood, 1/5-scale plane is beautifully engineered. The plans are very accurate compared with scale 3-views of the Zero A6M5 and the A6M3. So far, building this Platt kit has been very enjoyable and a valuable learning experience.

Dave is viewed by many scale modelers as the greatest scale modeler in the history of the hobby/sport. I agree. His accomplishments include the only perfect static score in the history of the Nats and the creation of stand-off scale and 1/5 scale. The instructions included in Dave's kits are full of helpful building and finishing tips. I've picked up a lot of great techniques that I plan to use in future projects. If you want more information about Dave's Zero or his other scale models, e.g., Spitfire, P-51 Mustang, Me-109 and Bücker Jungmeister biplane, send $1 for his current catalogue to Dave Platt Models, 1306 Havre NW, Palm Bay, FL 32907; (407) 724-2144.

**Addresses are listed alphabetically in the Index of Manufacturers on page 122.*

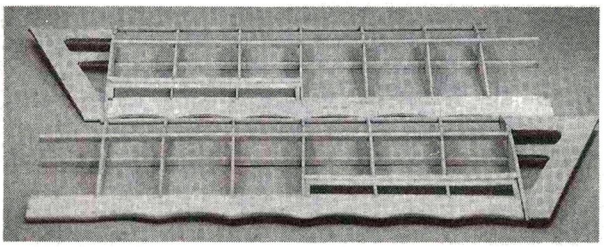
A quiet sport-scale homebuilt bipe

MODEL AIRPLANE NEWS CONSTRUCTION

DER ELECTRIK Jager

by CHARLES D. EVANS

THE PLANFORM for Der Jager has intrigued me for many years. Balsa USA made one, but it was too large for my collection of electric motors. One day, I stumbled across an article by Mr. Floyd Manly in the November 1984 issue of *Model Airplane News*. This sparked my interest, especially the 4-view drawings mentioned. Armed with dimensions and 4-views, I set out to create a scale that would result in the size shown here. After many calculations, the following design appeared.



The top wing halves prior to joining.

CONSTRUCTION

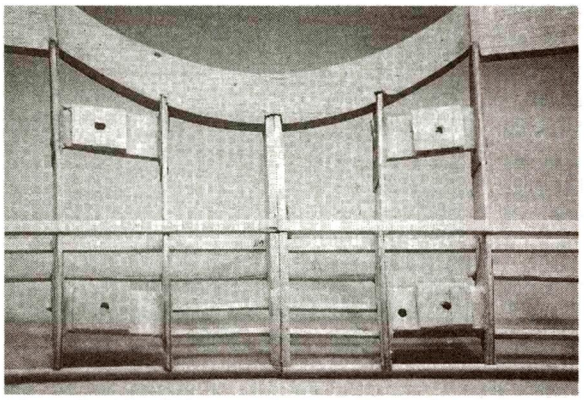
• **Wings.** Before you start to build Der Jager, make a kit of the parts. The process will move more quickly if all the components are handy.

There are no unusual building steps here. I have detailed any questionable items on the plans in an attempt to eliminate any problems you may encounter. The main difference between these wings and most others is the reverse taper on the top wing. To fashion the radius on the tip of each wing rib, use a 1/4-inch-diameter chain-saw file. Just a few strokes will result in the radius you'll need to attach the rib to the leading-edge dowel. The 1/32-inch plywood doublers can be cut with a stout scissors instead of a hobby knife. Be sure to press down hard enough when you install the 10-32 blind nuts in the top-wing mounting pieces and top-wing cabane to ensure solid penetration. A few drops of thick CA on the back of the blind nuts will help to hold them in position. After all four of the cabane mounts have been installed according to the plans, add balsa squares to build the cabane mounts up to the bottom of the wing rib. The aft center section of the top wing is laminated with 1/2-inch and 1/8-inch balsa sheet. Then the wing is carved and sanded to obtain the desired airfoil shape.

The 3/8-inch balsa sheet spars for the ailerons on both wings are a bit unorthodox. Refer to "tw5a" to get the shape. A sharp no. 11 blade and about 5 minutes work will get the job done. Note the 1/4-inch-square hinge backup blocks. These are not necessary, and the decision to use them is yours. Also note the 3/32-inch spar braces. I have used these for many years and have had no failures.

When sheeting the tops of the wings, note that the 1/8x1/4-inch turbulator strips are 1/16 inch above the ribs. These must be sanded to conform to the rib airfoil. After you've sanded the strips, install the 1/16-inch balsa. This finishes wing construction, with the exception of the wingtips. The parts shown are wider than the standard balsa sheet, so you must splice enough balsa together to cover the widest portion of the tip. Standard 4-inch-wide sheet will be adequate for the lower tips.

• **Stab, elevator, fin and rudder.** You must splice an extra piece of balsa onto a 4-inch-wide sheet to cover the fin. Do the same for the stab and rudder. The elevators need a piece added for the tips. I installed stiffeners in the tail surfaces because its surface can be rather flimsy. The 1/64-inch plywood doublers on the rudder and elevators may seem like overkill, but I use them to prevent the mounting screws of



The underside of the top wing's center section. Holes have been drilled for hold-down bolts, and blocks have been added to obtain +1½ degrees incidence.

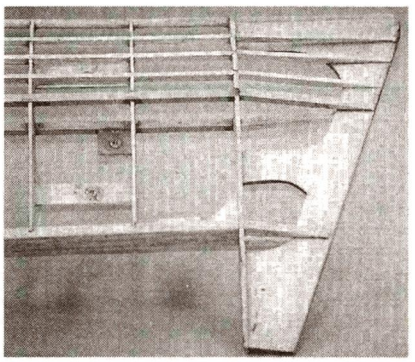
the horns from being pulled out of the balsa.

• **Fuselage**. Be sure to make a left side and a right side. Elmer's wood glue is used to join the 1/32-inch plywood doublers and the 3/32-inch balsa sheet. The 1/8-inch-square balsa stringers on the top and bottom edges of the aft part of the fuselage are installed after the formers have been glued into position. They are butt-jointed between the formers, and they strengthen the fuselage. Note the 3/16-inch balsa sheet used for the stab platform. This supports the stab and reinforces the rear of the fuselage.

This plane uses a "Y" pushrod to control the elevators. There are commercial products available, but the one shown on the plans works like a champ. Check the plans before you start to build one.

The aluminum cabanes may be a bit unusual. The aluminum is just soft enough to be bent and twisted to align with the wing mounting holes. I cut the aluminum with my scroll saw. I covered the aluminum with balsa using CA, then shaped the cabane to an airfoil. Note the triangular piece of hardwood for the front cabane strut. The 4-views show the extreme slant of this strut, and the metal cabanes will not twist and bend to meet the required angle. The rear strut can be shaped to meet the requirements shown.

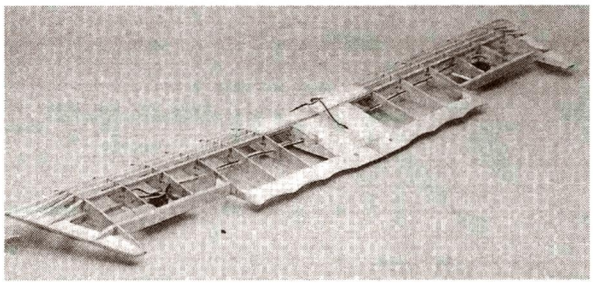
The BS series of parts refer to the battery support components. They can be adjusted to suit your installation. Remember to keep the center of the batteries' weight as close to the plane's center of gravity as possible.



Top-right wingtip showing the detail of tip construction and N-strut attachments.

SETTING UP

First, set the lower wing to zero degrees incidence. The next step is to set the stab at zero degrees. Use the Robart* Incidence Meter on



The completed bottom wing with the servos installed.

SPECIFICATIONS

Model: Der Electrik Jager

Designed and drawn by: Charles D. Evans

Wingspan: 53 in. (top), 45 in. (bottom)

Wing chord: 10 in. (top), 8.5 in. (bottom)

Wing area: 912 sq. in.

Airfoil: NACA 2412 Modified

Wing planform: reverse taper (top), constant chord (bottom)

Dihedral each tip: none (top), 3/4 in. (bottom)

Weight: 7 lb., 12 oz. (124 oz.)

Wing loading: 19.58 oz. per sq. ft.

Length: 42½ in. (including rudder)

Rec. motor: AstroFlight 40 geared cobalt

Batteries: 20 N1700SCRC Sanyo

No. of channels: 4 (rudder, elevator, throttle, ailerons)

Construction materials: plywood, lite-ply, balsa and hardwood dowel

Features: built-up construction using balsa, plywood and lite-ply; unique outline copies the full-scale Der Jager.

Comments: the plane flew smoothly right off the drawing board and exhibited no bad habits. Although the cowl takes some work, for the most part the plane is easy to build, and because of its electric power is very quiet. You'll enjoy flying it.

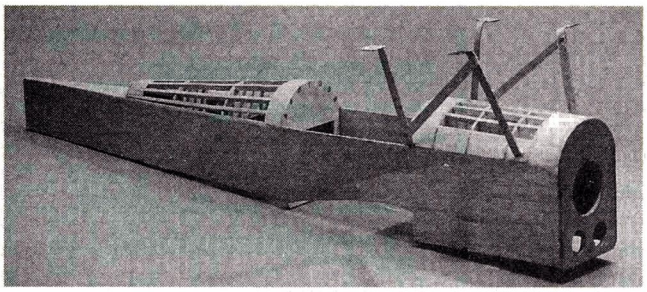
MATERIALS

Fuselage
Balsa pieces
3, 3/32x4x48 in. (medium)
12, 1/8x1/4x36 in. (strip)
1, 1/4x36 in.
1, 1/2x36 in.
1, 1/8x4x48 in. (light to medium)
1, 3/16x4x48 in. (light)
1, 1x1x12 in. (soft and light)
Plywood
1, 1/32x12x48 in. (ply)
1, 1/8x12x48 in. (lite-ply)
1, 1/4x12x24 in. (lite-ply)
2, 1/4x1/2x36 in. (spruce)
1, 5/32 x36 in. (music wire)
1 , 1/16 in. thick aluminum sheet (check metal suppliers for "off-all")

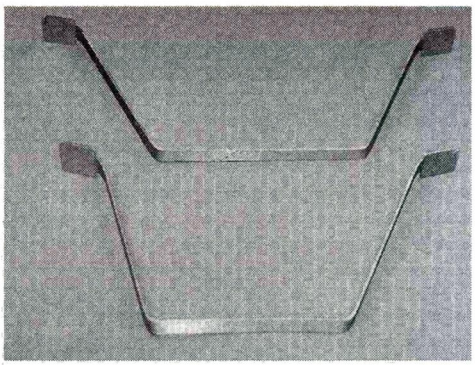
Stab, Elevator, Fin and Rudder
2, 3/16x4x48 in. balsa, light
1, 1/61x6x12 in. ply
1, 1/16x36 in. music wire
1, 3/4 in. tailwheel

Wings
7, 1/16x4x36 in. balsa, light to medium
4, 3/32x4x48 in. balsa, medium
1, 3/8x3x36 in. balsa, medium
1, 1/4x3x36 in. balsa, medium
2, 3/16x4x48 in. balsa, medium
2, 1/4x1/4x36 in. balsa
12, 1/8x1/4x36 in. balsa
1, 1/2x4x36 in. balsa, medium
1, 1/8x3x36 in. balsa, medium
1/8 in. lite-ply (see fuselage)
1/4 in. lite-ply (see fuselage)
1, 1/31x6x12 in. ply
2, 3/16x1/2x36 in. spruce
8, 1/4x1/4x36 in. spruce
1, 3/16 in. hardwood dowel
4, 1/4 in. hardwood dowel

Other Materials
19 Sonic Tronics* Nifty Hinges
1, 2 oz. instant-cure CA
1, 2 oz. gap-filling CA
4, 10-32 blind nuts
12, 4-40 blind nuts
4, 10-31 nylon bolts
8, 4-40 bolts
4, 4-40 bolts, 2 in. long
6, 4-40 bolts, 1 1/4 in. long
2, 1/4-20 nylon bolts
4, 2-56x3/4 in. bolts
4, 2-56 nuts
1, 2-56 threaded rod
1 pkg. 5-32 wheel collars
1 pkg. 1-16 wheel collars
1 pkg. 5-32 wheel pant mounts
1 pkg. steel L&G straps
2 pkg. small horns
3 control horns (elevator, rudder)
1 pkg. Sullivan's* Gold-N-Rod
7 metal clevis
2, 12x1/32x1/4 in. brass strips
1, 12 x5/32 in. square brass tube
Silver solder
Flightec* SecII Motor Control
Pkg. Dave Brown* Lite wheels



The fuselage with cabane struts attached.



Shaped aluminum cabane struts.

the wing and a "line level" on the stab. Be sure the lower wing is at zero degrees on the Robart meter, then carve, saw, file, or sand until the stab is at zero degrees. After reaching the correct setting, epoxy the stab to the fuselage, checking all the while that the wing and stab both stay at zero degrees.

The next step is to set the upper wing to zero degrees, using the Robart Incidence Meter. Shim between the cabane platforms and the wing until you reach an incidence of +1½ degrees, and then tighten down the 10-32 nylon screws. To secure the incidence, glue the shims to the wing. After both wings and the stab have been zeroed, zero the motor.

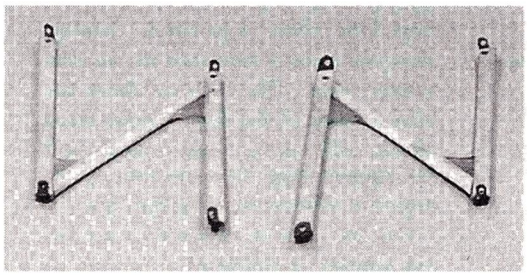
Balancing is a must. The easiest way to balance the plane is to move weight such as batteries, radio, etc. Another possibility is to balance the wings by drilling holes in the heavier wingtip. If the plane is tail-heavy, use a hole saw to drill holes in the stab, fin and rudder until balance is achieved.

The spats on the landing gear are made of 1/32-inch plywood and are purely decoration. They spruce up the landing gear but aren't necessary.

A Zinger* 13x6.10 wooden prop works well with the motor on 20 cells. There is plenty of zip in the AstroFlight* 40 geared cobalt.

COVERING

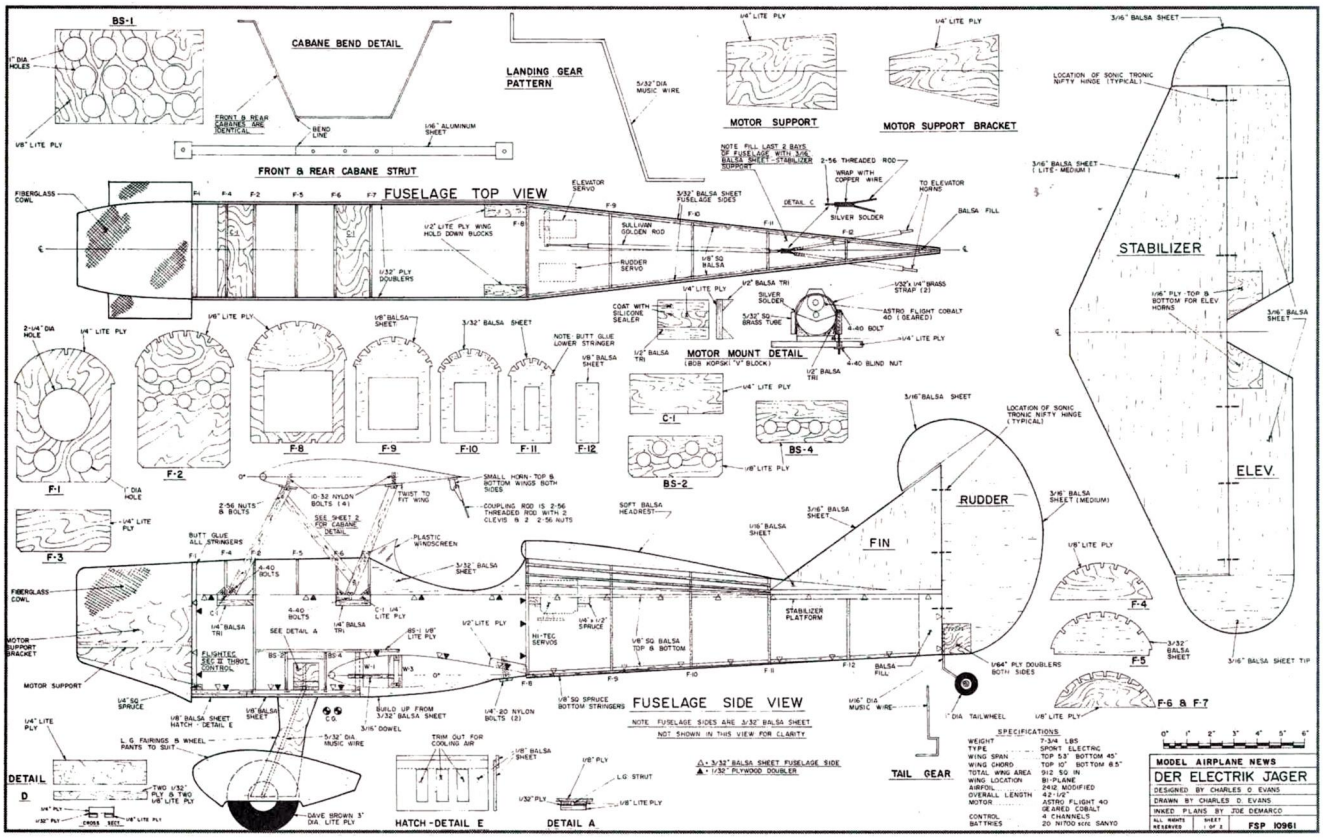
I used Oracover from Hobby Lobby*. All you have to do is follow the included instructions. I particularly like its coverage of solid structures. If you apply the covering with your iron set at 300 degrees, air bubbles will be nonexistent. Use a thermometer to check the temperature of your iron. Set the iron at 250 degrees for open structures, such as wings, and to shrink the covering, set the iron at 350 degrees. After a few days in the sun, the covering showed no sign of wrinkles.



When you construct the N-struts, be sure to make a right one and left one.

FLYING

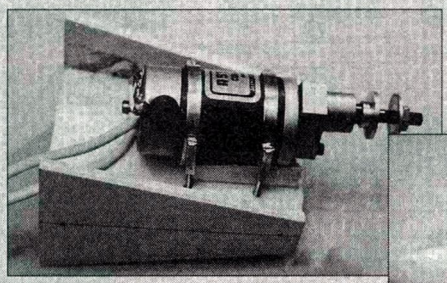
At last, the moment of truth! I turned on the arming switch and I was ready to go. The first flight was uneventful; this is always good news for designers. I checked all the control functions to be sure they were turning and following the transmitter. I taxied the plane to the runway, did one more control check, advanced the



TO ORDER THE FULL-SIZE PLANS (FSP10961), CALL 1-800-243-6685.

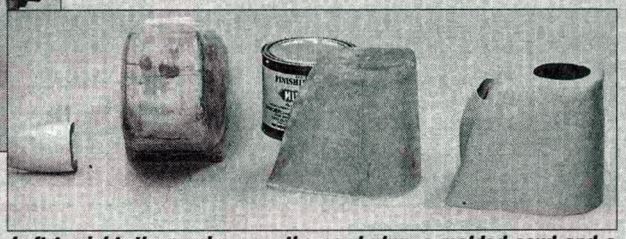
Making the Cowl

The cowl poses the only real building problem. I made a mold out of balsa (1/32 inch undersize to allow for the fiberglass cloth and resin). A mixture of Bondo, resin and cloth works well. A mold-release agent is necessary to separate the cowl and mold. I used Minwax paste for this. Apply as many coats to the mold as are necessary to get a very smooth surface, and polish the wax after each coat.



The mounted AstroFlight 40 cobalt motor.

The fiberglass and resin are laid on the outside of the mold. It takes some effort to ensure a smooth finish. To give the cowl necessary stiffness, use reinforcing bands on the inside around the fuselage opening and near the nose. Don't forget to clean the inside of it and remove any residual wax. If you don't, the reinforcements won't stick. It's a bit of work, but worth the effort.

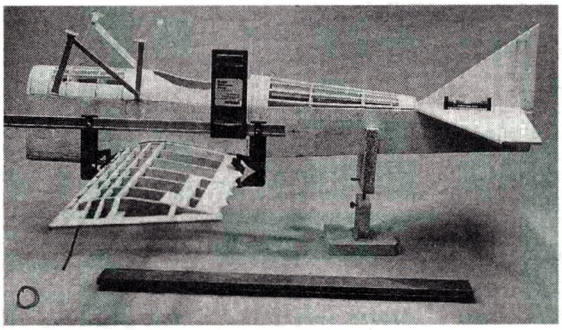


Left to right: the cowl scoop, the cowl plug, a molded cowl and a finished cowl.

throttle and took off. The plane tracked straight and true and lifted off as I wanted it to. It is very responsive to any controls I give. My radio is an old, but reliable AristoCraft* 720 Challenger that I have used for years. Loops, rolls, inverted, snaps, splits, etc; the plane does all this pilot is capable of doing. A better pilot could make it sing.

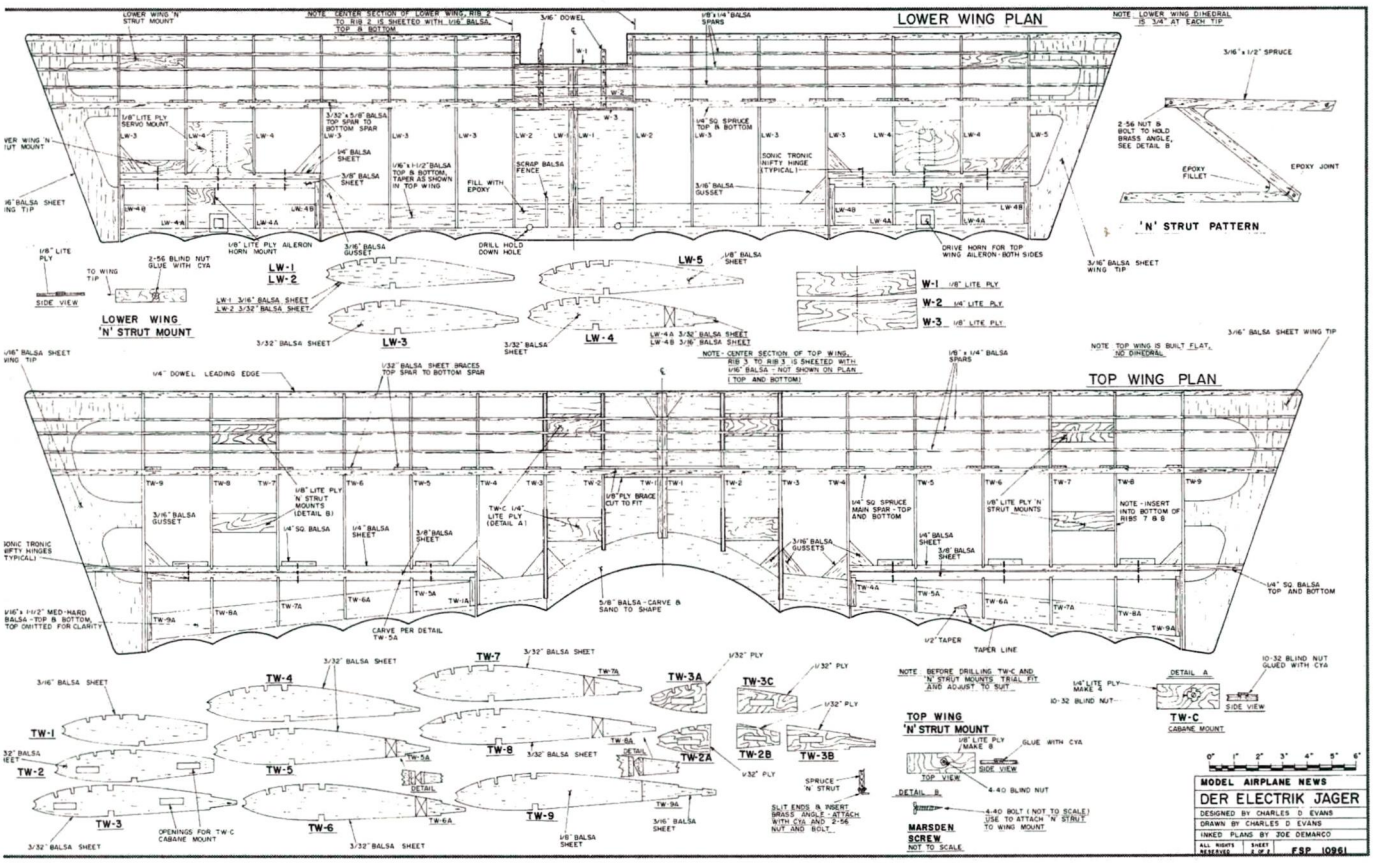
I hope you enjoy your Der Electrik Jager as much as I do. Keep its construction light and it will perform well. Fly quietly. Fly electric.

Bottom of the fuselage showing the gear attachment. Note the holes drilled in the formers to lighten the plane.



Setting the incidences with the Robart Incidence Meter and level.

**Addresses are listed alphabetically in the Index of Manufacturers on page 122.*



MODEL AIRPLANE NEWS

FIELD & BENCH REVIEW

Air-superiority weapon for the ducted-fan modeler

JD MODEL PRODUCTS

F-18 HORNET

by TED SCHMIDT

JD MODEL PRODUCTS'* F-18 Hornet—a single-engine, ducted-fan jet with a bifurcated (twin) exhaust duct to simulate a twin-engine look—is a very nice sport-scale representation of the full-size F-18 Hornet. The one-piece, 42-inch-span model is 55 inches long and has a full flying stab. The model that I'm reviewing is a basic kit that I purchased several years ago and just recently finished. The kit (still being manufactured and marketed as the "basic kit") includes everything you'll need except paint and glue. Throughout this article, I'll point out the major differences between the basic kit and the new, deluxe kit, which includes several improvements to make construction easier.

FUSELAGE

The one-piece epoxy/glass fuselage is relatively free of pinholes. It comes with a removable framed hatch that makes it easy to access the engine compartment. I set up the hatch with two 1/8-inch dowels in the front, and I held it in place with a latch in the rear. It works, it's simple, and it's very convenient. The new kit retains these features, and it's available with an optional gelcoat. A gelcoat finish reduces the finishing time. The fuselage is fairly stiff and requires only a few formers. It was strong enough to survive four deadstick landings over grass with the gear up. The only damage was some scratched paint.

To frame the fuselage, epoxy the following plywood pieces:

- one 1/8-inch plywood former in front of the rudders and a small 1/8-inch former that keys the rudder to the fuselage;
- one 1/4-inch plywood landing-gear plate, which is for both main gear retracts (Spring Air* retracts are used).
- two main formers that rest on top of the landing-gear plate. The forward former is 1/4-inch plywood and the wing spar is part of its design. The second former is 1/8-inch plywood, and it's installed 1 3/4 inches behind the front former.

The fan-mounting blocks are glued between these two formers for a very stiff setup. To accommodate soft mounts, I lowered this mounting block approximately 3/8 inch, which I highly recom-

Ted (left) and pilot Robbe Lynch.

SPECIFICATIONS

Name: F-18 Hornet

Manufacturer: JD Model Products

Type: sport-scale ducted fan

Wingspan: 42 in.

Wing area: 635 sq. in.

Wing loading: 43.63 oz. per sq. ft.

Airfoil: semisymmetrical

Length: 55 in.

Weight: 12 lb.

Radio req'd: 5-channel (rudder, throttle, elevator, ailerons and retracts)

Engine req'd: .65 to .91

Engine used: Rossi .65 w/Dynamax fan unit and JMP tuned pipe (a BVM .81 and pipe were also used).

List price: $384.99 (basic kit); $634.99 (deluxe kit).

Features: the model includes everything you'll need except paint and glue. It has instructions, a fiberglass fuselage (gelcoat is optional), foam-core wings and sheeting, a thrust tube, a formed and framed access hatch and all the plywood formers and parts. (Optional hardware package is available.)

Comments: I built an earlier version of the kit that required cheater holes in the fuselage. I modified the kit and installed my own internal inlet ducting. The new deluxe kit has many factory-assembled parts, including factory-glassed wings and an intake duct to make assembly easy.

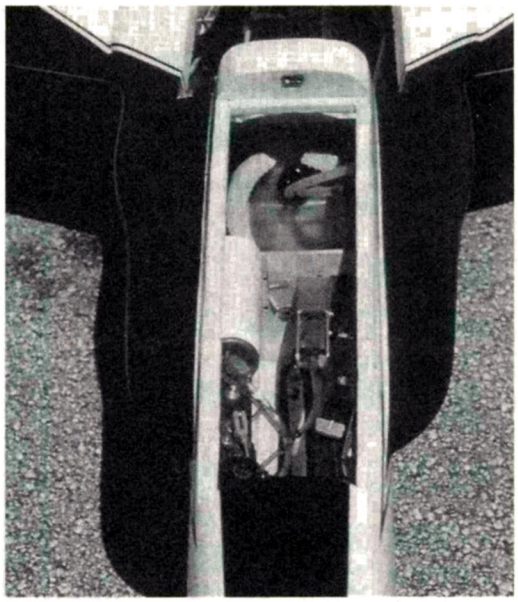
Hits

- Great low-speed flight performance.
- Good looks.
- Excellent maneuverability.

Misses

- Difficult to build the wooden stabilizer (old version of the kit). The new basic kits have airfoil-shaped foam-core stabs.

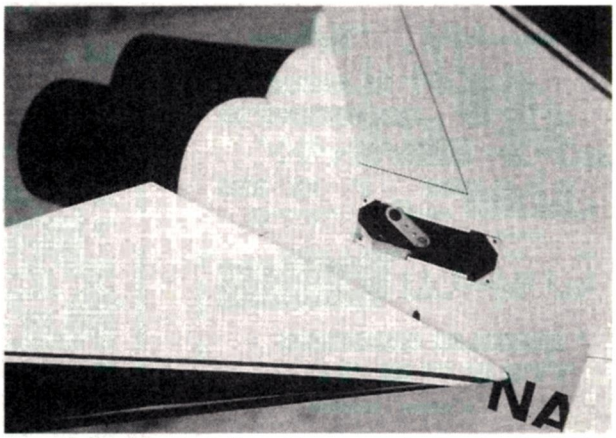
mend for any ducted fan. Be sure that the fan sits low enough to allow the main hatch to close without interference. The aircraft was set up for a Dynamax* fan. (The next one I build will be set up for a Viojett*.) In the new kit, all these formers have been installed, and that saves construction time.



The cockpit hatch makes it easy to access the retracts, the radio and the fuel system.

WINGS, STABS AND RUDDERS

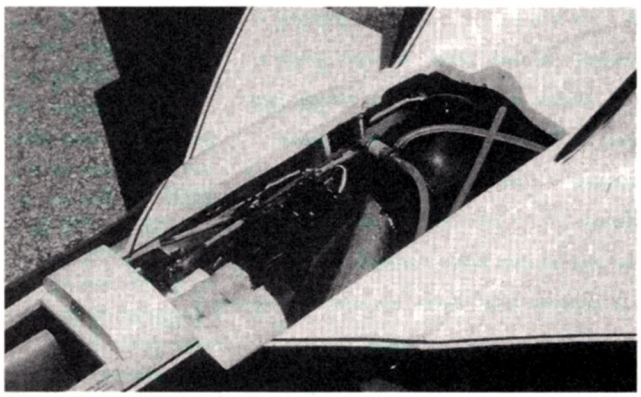
The wings are conventional foam-cores that I sheeted with 1/16-inch balsa. To make the flying stabs and rudders, I glued together 1/4-inch hard balsa to form a 1/2-inch-thick piece. I tack-glued 1/32-inch plywood airfoil templates to the roots and tips of these pieces. With these airfoil templates in place, I sanded the 1/2-inch balsa to the required shape—a lot of work. Fortunately, the wings, stabs and rudders in the new deluxe kit are already made and glassed. This alone is a major timesaver.



A small hatch in the tail provides access to the elevator (flying stab) servo.

MODIFYING THE BASIC KIT

One item that's an absolute must is a good inlet duct with a rounded lip. My old kit didn't have one and was supposed to be set up with cheater holes. I made a custom inlet duct that included splitter plates and a tube to enclose the fan spinner. Cheater holes are not necessary, and they'll actually hurt the model's performance. JD Model Products is working on an inlet for this model and will have one available soon.



The main fuselage hatch also makes it easy to access the engine/fan unit. Note my homemade inlet ducting and the in-flight fuel-mixture control valve.

The canopy was glued on with Zap* glue. I deviated from the instructions and made a removable hatch out of the canopy; this made it easy to access the components mounted in the nose, i.e., retract and associated accessories, servos and radio gear. With my setup, removing this hatch is the only way to access the fan spinner to start the engine.

To enclose the muffled tuned pipe, I extended the fuselage's exhaust tubes (not the bifurcated exhaust duct) 2 inches. The tubes were made by rolling two layers of medium K&B* fiberglass cloth over a plastic cup of the appropriate size and applying epoxy resin. Once they were dry, I glued the tubes to the fuselage and faired it in with a mixture of epoxy and microballoons. This modification will improve the appearance if a conventional pipe is used. If the builder doesn't want to do this, JD Model Products makes a short pipe that makes this modification unnecessary.

FINISHING

I finished all the wood surfaces with K&B's 3/4-ounce glass cloth and polyester resin. After a thorough sanding, I applied small amounts of filler as needed and primed

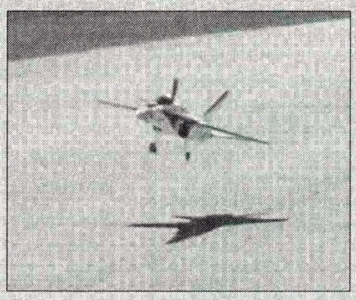
As of this review, I've made 15 flights with my F-18. I used a Rossi .65 and a JMP* .65 muffled pipe for the first four flights, and the model flew well.*

FLIGHT PERFORMANCE

• Takeoff and landing

During the first attempts to fly the model, I had problems getting it to rotate because the point of rotation was slightly too far aft of the CG. I corrected this by straightening out the main gear wires to move the point of rotation closer to the CG.

For takeoff, I usually allow a roll of about 250 to 300 feet on the concrete runway before I apply elevator to rotate. I prefer to use some exponential on the ailerons and nose-gear steering, and I keep the flying stabs on full rate all the time. Full throws are 3/8 inch on aileron and 1½ inches on elevator. As the airplane rotates, you must maintain slight pressure on the elevator stick to keep the nose up. Once the airplane is on step, elevator backpressure is no longer required.



The JD Model Products F-18 is a compact, fun-to-fly ducted-fan model with good slow-flight characteristics.

I was very impressed with the slow-flight characteristics during the first flight. With the flaps up, the airplane just floats and can be flared and landed on its mains at approximately 20mph. Not bad considering the finished weight of the airplane is 12 pounds. I must caution, however, that because of the narrow main wheel stance and generous rudder surface area, tracking straight on the ground with a crosswind can be a challenge. Most of this problem can be solved by using 3/16-inch-diameter main-gear wires and wheels that have hard rubber and, preferably, bronze axle bushings. The only drawback is that the main wheels protrude slightly from the fuselage wheel well. Believe me, this isn't noticeable when it blasts by at 140mph.

• Low-speed performance

This airplane is stable; at lower speeds, it still tracks where it's pointed, and it doesn't drop the nose on a turn. It won't tip-stall because the leading-edge extensions produce a fair amount of lift. After several flights, I removed the flap servos and deactivated the flaps to save weight because they are not really required.

• High-speed performance

This is where the real fun begins and where all ducted-fan models are at home. All maneuvers are crisp, and tracking is straight and true. There's no trim change at full throttle. I estimated that straight and level flight speed was 120 mph; however, I wanted a little more performance, so I changed to a Bob Violett Models* (BVM) .81 engine and pipe. Takeoffs now have considerably more authority, and the top speed has increased by 20mph. I don't recommend anything less than a strong-running .65.

• Aerobatics

The model can perform just about the same maneuvers as its full-size counterpart. The roll rate is incredibly fast, which is why I use some exponential on aileron to remove some of the sensitivity around neutral. Inverted requires almost no down-elevator, and loops can be as large as you want.

it with K&B primer. There's no substitute for elbow grease if you want a nice finish. I used an automotive polyurethane paint that's fuelproof, very durable and easy to apply. It flows beautifully and dries to a beautiful gloss. Most of the decals on the model came with the kit.

If I'm enthusiastic about this sport F-18, it's because I'm having a blast with it. I've started to use it as a Sunday flier when I'm not flying my other ducted-fan models. Anyone who can fly a low-wing airplane can have as much fun as I'm having. The updated kit is much easier to complete; basically, you just have to assemble it, finish it and install the components.

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*Addresses are listed alphabetically in the Index of Manufacturers on page 122.

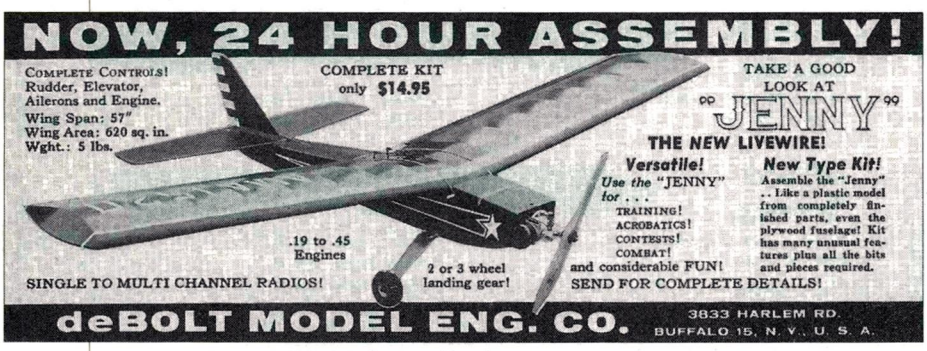
Golden AGE OF R/C

by HAL deBOLT

"QUICK-BUILD" R/C

I BET that if you examined the ads in this issue, you would find that a majority expound the virtues of ARFs. 'Twas not always so; in fact, there were no ARFs in the early '60s! The ARF label is said to have been coined by genial Bill Northrup while he was an editor at *Model Airplane News*. I'm happy that Bill joined us with the Howard McEntee model and was inducted into the R/C Hall of Fame at this year's WRAM show. Welcome aboard, Bill!

Today's ARFs are certainly near the peak of perfection for ease of construction. This obviously did not happen overnight, so a little background should be of interest.



Dmeco's "Model Airplane News" ad announces the first Quick-Build kit.

Phil Kraft and his need for a "quick and dirty" test bed for radios provided the inspiration. Phil went to his local hobby shop and came away with a bundle of stock balsa, which his fertile mind soon turned into the "Ugly Stik." The Stik's performance created an "I want one of those" syndrome, and the stage was set for modelers to appreciate a "quick build." Previously, modelers thought that to be usable, a design had to be pretty and thus complex. The easy-to-build Ugly Stik changed all that and showed that good looks aren't vital to utility and performance.

As a leader in R/C kit production, my company, dmeco, recognized the value of the Ugly Stik design and came up with the Live Wire series. Previously, designers had been more concerned with aerodynamics and appearance than ease of assembly and utility (we were still learning!). But now, the primary objective was to develop a plane that could be built quickly and would be rugged, easy to fly and highly maneuverable. With these needs, this could not be just another run-of-the-mill trainer! So considerable forethought went into what would become the Live Wire Jenny. The full-scale Curtiss Jenny JN-4 was close to this style of R/C, so the name "Jenny" was adopted.

NO FRILLS

Let's see what the gray matter conjured up. To achieve quick assembly, pretty curves and such were eliminated. As the plane was conceived, no carving would be required, and only light sanding would be needed—a simple airframe. A shoulder-mounted wing would improve maneuverability and provide maximum utility, so modelers would have no problem getting at things.

To create a plane that could be built quickly, a major change in kit production methods was needed. All the parts would have to be machined to exact size and shape so that modelers would have to do nothing but glue them into place. This meant that special tooling had to be created for each part. Previously, parts had not been individually tooled; they were produced close to the right size, and fitting and shaping was left to the modelers. Thus, for the Jenny, a great deal of work was required before the first kit could be made.

For simplicity and ruggedness, a plywood forward fuselage was used. This robust section would absorb all flight and landing loads. The engine was attached to the front with a universal, aluminum-alloy, radial-mount plate, which was isolated from the structure with a thick neoprene rubber gasket. (Shades of noise reduction?)

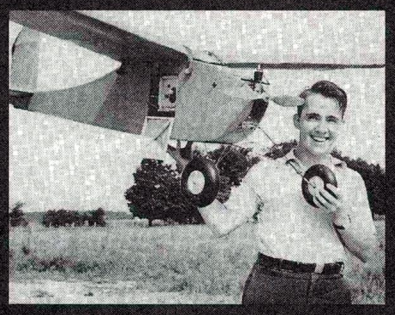
The landing gear was bolted to sturdy maple blocks set between the plywood sides. There was a choice of a 2- or 3-wheel gear. The main gear was made of ready-formed aluminum alloy; the other was a dmeco, all-metal, adjustable, flat-bottom-mounted, steerable nose gear. The wing was also attached to the plywood fuselage. Shaped balsa saddles were used for the required wing seat.

All the plywood was machined to exact size and shape and was ready for glue. In addition, all the required mounting holes were provided. To eliminate the need for separate servo mounts, the servos were attached to the ply fuselage sides, and holes were provided. The balsa aft sides were spliced to the plywood. The robust structure could easily be assembled in a couple of hours.

Generally, assembling wings is a time-consuming chore, so a great deal

Jenny arrived in reed days and really came alive with propo. It was simple but an excellent match for most pattern types.

DR. WALTER A. GOOD, OCTOGENARIAN



A young Walt with the Nats-winning Big Guff, which was scaled up from the Goods' free-flight Guff.

Center: Walt in the '60s with his TTPW-equipped Multi-Bug.

Left: Walt today, active with his Pasco County club in Florida.

Today, we take so much for granted that it can be difficult to remember our heritage. Washington and Congress are there; the "big three" continue to pour out cars; and we have exotic model aviation, our AMA, manufacturers and the good life. It was not always that way. This country and our sport were built by dedicated friends—people who made it all happen and often through sacrifice. Many of the friends who have blessed the field of model aviation have devoted their lives to providing what we have. Some who come to mind are Frank Ehling, John Worth, Bill Winter, Walt and Art Schroeder, Al Lewis plus the many, many at local levels. They all did us good!

One of those who has definitely earned a spot on that list is Walt Good. We know him as the "father of R/C," but as a modeling friend, he has gone far beyond his trailblazing achievements and continues to do so. While he was with the AMA, he helped us over many a high hurdle. He has been involved with an endless list of committees and projects. Above all, he was an outstanding president and was very instrumental in advancing our cause with the FCC. We can thank the powers that be for a friend like Dr. Good!

Walt and Bill Good hail from the days when free flight was all we had. They were "good" at it! When Bill got into electronics, they saw the possibility to enhance our modeling with controlled performance. This effort led to the Good R/C system, the Big Guff, R/C demonstrations and the National Championships. Eventually, they gave us a peek at what we now call propo with the TTPW R/C system. Best of all, at 80 years young, Walt is still active in R/C gliding.

My friendship with him developed through AMA associations and the excellent guidance Walt provided our first world championship team. In Europe, without his experience and knowledge, our team would have been lost. I cherish this "good" friend!

To celebrate Walt's 80th, his Pasco County, FL, club put a great deal of effort into a surprise birthday party. The event was an outstanding success, and Walt was honored by many friends. Walt says that he and his wife, Joyce, thoroughly enjoyed it and look forward to number 90!

We can all thank this fine gentleman for his unfaltering friendship.

of thought went into creating a "quickie" wing for the Jenny. The solution was a robust, single spar centered between the top and bottom ribs. Accurately drilled holes in the ribs aligned them neatly when they were placed on the spar. The precisely shaped leading and trailing edges were notched to properly space the ribs. As a result, the wing could be completely assembled before it was glued. A time check showed that the Jenny wing could be assembled in about an hour! Complex ailerons were eliminated by the use of the dmeco-developed strip ailerons and dmeco's polypropylene strip hinges.

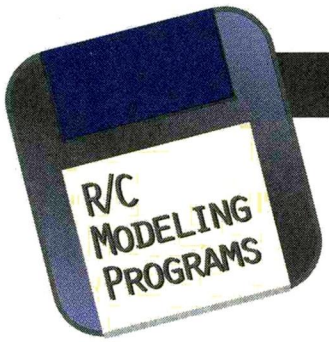
If each part required its own tooling and had to be separately produced, how was high-volume production attained? Tremendous sales were anticipated, so all tooling was designed to produce a minimum of 12 pieces at a time. Otherwise, the demand for the Jenny could never have been met. The only time-consuming step not made quicker was covering and finishing. We were stuck with "silk and dope"; film had yet to be developed.

When the Jenny was ready for the market, dmeco advertised it as requiring only 24 hours for assembly. Modelers responded with disbelief until they got their hands on it. Very quickly, there were comments such as, "What do you mean, 24 hours? I had mine ready to cover in 15!" After such a major production overhaul, these reports brought me much satisfaction.

In flight, the Jenny proved to be all that its designers hoped. The prototype immediately did all that it was supposed to. One of its abilities was surprising. When inverted, the Jenny naturally climbed with neutral elevator. A bit of up-trim was required for level flight. The plane had one shortcoming: in a spin, the prototype went flat and did not recover, but the worst result was a broken prop. The solution was the addition of the sub-fin, which some thought wasn't needed, but it quickly ended complaints about the flat spin.

There is no comparison between the Jenny's kit box of parts and the completed structures in modern ARFs. But when the Jenny was created, its like had not been seen before, and it was a first step toward today's R/C achievements.

The Jenny kit was a resounding success, and dmeco was hard-pressed to meet the demand. As you can imagine, much balsa dust flew!



THE MODEL AIRPLANE NEWS

Software Survey for Modelers

by PAULA GARWOOD

SINCE WE DID our 1995 *Model Airplane News* survey of software, the number of programs offered has increased from 28 to 36, and this is our latest effort to catalogue what's available for aeromodelers.

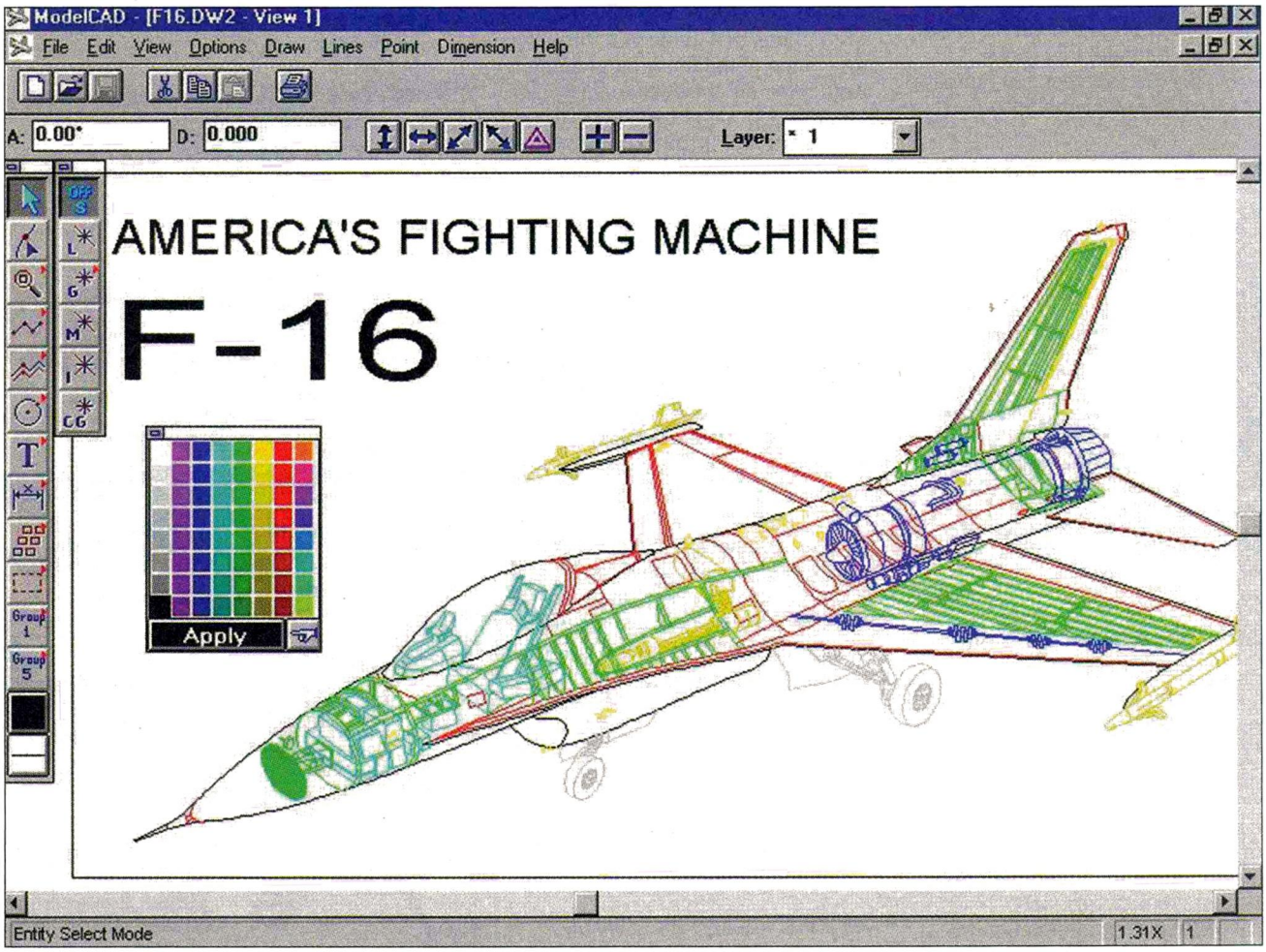
Inquiries were sent to all of the 1995 participants, and invitations to newcomers were posted with topic-related news groups on electronic communication servers. The software publishers who responded were eager to share information about the latest programs offered to support analysis, design and construction of model aircraft. (R/C flight-simulator programs will be discussed in a future article.)

New to this survey is a three-dimensional photographic modeling program that can take two or more photographs and create a three-dimensional image from them. Another new program provides a spreadsheet template that will create aircraft measurements from geometric attributes, and it contains a substantial data base of existing designs.

The software falls into three major groups, and a fourth group contains miscellaneous software.

CAD PROGRAMS

The largest group in the survey, these range from complete wing-designing programs to raster/scanned plan enlargers and diagram/blueprint reproducers. One program includes unlimited scales: draw a model and print it at any scale; another offers 200 airfoils. The programs include uncomplicated design tools and area calculators that come with complete instructions. Prices vary from less than $20 to $170.



PERFORMANCE ANALYSIS AND PREDICTION

This is the second largest group in the survey. It includes performance predictors for electric and ducted-fan models, helicopters and sailplanes. They allow you to calculate area, aspect ratio, center of gravity and mean aerodynamic chord and then to vary these factors and determine their effects on the flight design. Some feature extensive libraries, and their prices range from less than $20 to $500.

AIRFOIL DESIGN, ANALYSIS AND PLOTTING

Several programs provide airfoil data, and one provides a built-in CAD utility for making controlled airfoil changes. Prices range from around $20 to $1,700.

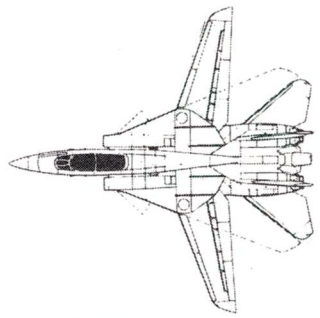
MISCELLANEOUS

In this category, you'll find programs that keep track of club membership, etc., that help you maximize your use of construction supplies and find that magazine article you *know* you saw somewhere.

If you already understand and enjoy using your computer for modeling, you'll find most of these software packages flexible and adaptable as well as affordable. Upgrades and Windows versions are either already here or will be in the near future, and extensive technical support (often at no charge) is available.

Compiled by Paula Garwood in May 1996 from information supplied by software publishers. Information is listed in this order:

- program type;
- computer required;
- printers supported;
- major program features;
- special features;
- price;
- where to order and call for technical support.



CAD PROGRAMS

■ ModelCAD/ ModelCAD for Windows

- CAD with design calculator and ModelCalc included.
- IBM 8086 or higher.
- Lasers, dot-matrix and others; about 180 printers supported.
- Operated with quick, single keyboard commands. Very flexible text handling in 16 fonts; infinite zoom; entity (object) selection for edit, copy, move, etc. Includes airfoil symbols, many draw and edit tools; 63 layers, 16 colors; unlimited scales: draw model and print at any scale; find center of gravity. Upgrades to DesignCAD. ModelCAD for Windows features 256 colors.
- Designed for modelers by modelers.
- Free technical support: (800) 233-3223; (918) 825-4844; fax (918) 825-6359; www.viagrafix.com.
- $99.95.
- ViaGrafix Corp., One American Way, Pryor, OK 74361-8801; (918) 825-4844. http://www.viagrafix.com email: sales@viagrafix.com

■ en LARGE IT—ver. 1.6

- CAD.
- Any IBM-compatible.
- Epson-compatible dot-matrix printer.
- Enlarges any raster/scanned plans or 3-view to 1/3 scale or larger. Prints plans on panels of Z-fold continuous printer paper. Accurate within dimensional stability of paper.
- No CAD drawing required. Enlarge any 3-view to final size, then draw in your structure, or enlarge any existing model plan. Will also reduce plans.
- $99 (including large original plans).
- Concept Technology, P.O. Box 669, Poway, CA 92074; (619) 486-2464 (evenings).

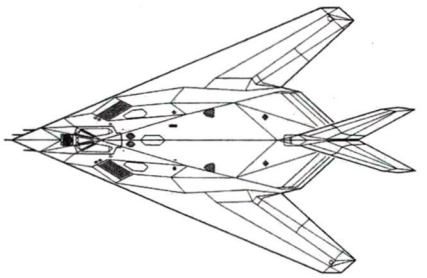
■ CaddView—ver. 2.0

- CAD: trace and import vector drawings of plans, drawings, topographic maps.
- IBM 80286 and VGA video and mouse to trace images.
- Epson-compatible dot-matrix, HP LaserJet II-compatible laser.
- A vector and raster program combined, it traces aircraft photos, diagrams, blueprints, illustrations, line drawings and output vectors in Drawing Exchange Format (DXF) and Generic CADD format for input into CAD programs.
- This stand-alone program requires no other CAD to run "under." Nearest competitor costs about $1,000 and requires AutoCAD.
- $59.95 (free demo version by mail, or download from CompuServe).
- Monumental Computer Applications, 9 Genesee St., Cherry Valley, NY 13320; (607) 264-8149 (to order); (607) 264-3307; BBS (607) 264-3307. 71054.47@compuserve.com (to order).

■ StarCAD Plans

- Model plans in AutoCAD DXF format on disk.
- IBM 8088 to 486 and a CAD software package.
- With CAD/DRAW software, all printers supported.
- Four sets of plans available—all R/C with more on the way: control-line, free-flight, indoor, etc.; considering rockets and boats.
- Very few offer this type of distribution.
- $7.95 to $24.95 ($3 S&H—Priority Mail).
- StarCAD Plans, 4321 W. Jupiter, Tucson, AZ 85741; (520) 744-0229. http://www.azstarnet.com/~stcad email: stcad@azstarnet.com

CAD PROGRAMS



■ Model Design—ver. 4.0, Model Design Pro

- CAD: airfoil, wing and utility plotter.
- IBM XT-compatible with 640K memory.
- HP LaserJet, InkJet, dot-matrix printer.
- A complete wing-design program, it has all the airfoil-plotting features of Airfoil Plot 6.0 and can plot wing plans, circles, ellipses and angle templates. Model Design 4.0 comes with 42 airfoils; Pro version includes more than 200 airfoils plus Dave Squires AFEdit screen-editor program.
- Easy to use; minimum computer requirements; unconditional money-back guarantee (if not satisfied, return within 30 days for a refund). Only a CAD program can do more, and Model Design is easier to use.
- $50—Model Design ver. 4.0; $75—Model Design Pro.
- Chuck Anderson, P.O. Box 305, Tullahoma, TN 37388; (615) 455-6430 (to order and for tech info); (615) 455-5788.
  73757,1144@compuserve.com
  email: canders@edge.ercnet.com

■ Computer Aircraft Designer ver. 2.1

- CAD: 3-D CAD and aerodynamics analyzer.
- IBM 80286 with EGA, VGA, or SVGA graphics, mouse.
- Dot-matrix, HP LaserJet, or HP plotter.
- Very flexible and easy to use. Full airframe design, including airfoils, formers. Displays 3-D and perspective and on-screen rotation. Handles simple and odd ball designs. Electronic wind tunnel: analyzes stability and control. Imports DFX, PCX, GIF files.
- 3-D CAD and aerodynamics are completely integrated into a full-spectrum design program, from wing-rib placement to stall-speed calculation.
- $79.95.
- Computer Aircraft Designs, P.O. Box 96, Herndon, VA 22070; (703) 476-2438;
  BBS (703) 476-9832;
  email: cad@access.digex.com

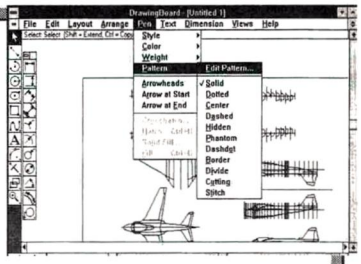
■ RC Design Tools

- CAD.
- Any IBM-compatible.
- Epson/IBM-compatible dot-matrix printer.
- Four simple, traditional enlarging tools using your computer. No CAD program or CAD skills are required. The tools: scaling calculator; grid paper maker; scale ruler printer; area calculator. RC Design Tools are easy to use and come with complete instructions. All you need to know is how to start the computer and use the keyboard.
- Unique set of features.
- $19.95 ($1 S&H).
- Concept Technology, Dave Bessel, P.O. Box 669, Poway CA 92074-0669; (619) 486-2464.

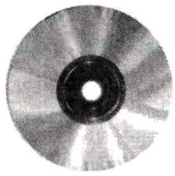
■ WingDesigner PRO—ver. 1.05 with EditFoil ver.1.0

- CAD/CAM mechanical design programs.
- IBM 80286 with VGA graphics.
- Most 9- and 24-pin dot-matrix printers as well as laser printers.
- D-design constant-chord or tapered wings with the same or different airfoils for the root and tip. Spars may be of any size and don't have to be full length; sheeting may be shown. Wing top view and ribs may be plotted. The PRO version exports in DXF format for import to AutoCAD. Spar cutouts are shown on each rib. All outputs are available on screen, so the design can be viewed before it's plotted. A design report may be printed. Expand command allows easy smoothing of the leading edge. Spars of any size or shape may be placed in any position on the wing. Show aileron and flap outlines. Place wing fixture hole targets on each rib. Sweep back or forward.
- $129.95—standard version; $169.95—professional version.
- C&J MicroSystems, Jim Darby, P.O. Box 8367, Bartlett, IL 60103-8367; (708) 213-3571 (after 7 p.m. CST).

■ Ashlar DrawingBoard



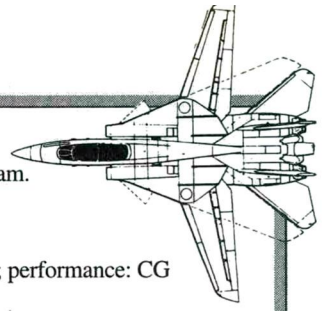
- Windows-based, 2-D, computer-aided design.
- IBM, Macintosh and Power Macintosh.
- Any printer.
- DrawingBoard comes with a 300-plus-page instruction manual and three installation disks. Program features include Tool Box, Drafting Assistant, normal and variable parametric control, Smart Wall and spline import capabilities for BMP, WMF, DXF and ASCII text files.
- 2-D version of the more powerful and expensive Vellum 3-D program used by such notable people as Burt Rutan. DrawingBoard is very easy to use and has many features found only in high-end CAD programs.
- $169.
- MCE Software, 801 Pine St., Seattle, WA 98101; (800) 392-3046, (206) 621-1988; fax (206) 382-9293.
  http://www.mcesoft.com/software
  email: mce@isomedia.com



■ Airfoil Plot—ver. 6.0 and ver. 6.0 Pro

- Airfoil plotter: prints patterns and templates.
- IBM XT-compatible with DOS 3.2 and 640K memory.
- HP LaserJet, dot-matrix, InkJet printers.
- Plots airfoils and foam-core templates from data files. Quabec, NACA 4-digit and NACA 5-digit airfoils are plotted from built-in equations and do not require coordinates. The program includes a data-entry module for entering coordinates and a utility program for modifying airfoils. Basic program comes with 42 airfoils; the Pro version includes more than 200 airfoils, plus Dave Squires AFEdit screen-editor program.
- Ease to use; minimum computer requirements; unconditional money-back guarantee. If not satisfied, return program within 30 days for a refund.
- $35—standard version;
  $60—professional version.
- Chuck Anderson , P.O. Box 305, Tullahoma, TN 37388;
  (615) 455-5788.
  73757.1144@compuserve.com
  email: canders@edge.ercnet.com

■ Design CAD 2D, 3D Aerodraw



- CAD, CAD Utilities, includes airplane performance program.
- PC 486.
- All printers and plotter.
- CAD, CAD Utilities: lofting features, airfoil manipulation; performance: CG calculation; basic Aero Calc.
- Lofting technique.
- $200—Design CAD; $100—Aerodraw.
- Design CAD: American Small Business, One American Way, Pryor, OK 74361; 918-825-7555;
  Mlaible@ssf4.jsc.nasa.gov; http://www.phoenix.,net/~mlaible
  email: mlaible@phoenix.net
  Aerodraw is available through the Windsoft Co. and distributed by Bob Holman Plans, P.O. Box 741, San Bernardino, CA 92402; (909) 885-3959.

■ Scanover

- Design and other utilities: trace scanned images into CAD.
- IBM AT with VGA 16 colors.
- No printer needed.
- Provides a way to easily get a 3-view or another drawing into your CAD program. Scanover is a TSR that allows you to trace scanned images on your CAD screen. Versions available for AutoCAD, DesignCAD 2-D, Envision It, Generic CADD, ModelCad. Please specify CAD program with order.
- CAD-ART Systems Ltd., 4801 45 St., St. Paul, Alberta, Canada T0A 3A3.
- Windsoft Co. will scan your drawings or three views for use with the program, for a very reasonable price. Call Bill Windsor for more info.
- $99.95 (Modeler's combination: with Dot Matrix Plotter—Basic: $144.95).
- Windsoft Co.; distributed by Bob Holman Plans, P.O. Box 741, San Bernardino, CA 92402; (909) 885-3959; fax (909) 889-9307.

■ Wingmaster: Model Wing Designer

- CAD: model wing ribs and planforms.
- IBM 80386 running Windows 3.1 or later in enhanced mode.
- Windows printers.
- Select from more than 250 airfoils, including historical (Clark, Curtiss, USA, Gottinger, RAF) and more than 100 Eppler and modern airfoils. Customize any airfoil, modifying thickness and camber. Apply airfoils to wing design, using multiple airfoils in a wing. Print complete wing plans—to scale or fit to page. Produce plot files or transfer drawings to DesignCAD, ModelCAD, or other CAD software using HPGL output.
- Produce NACA 4-digit, 5-digit, and 6-digit series airfoils. Look up answers quickly with extensive online help. Print large drawings on printers of normal size using automatic paneling.
- $129.
- ViaGrafix Corp, One American Way, Pryor, OK 74361-8801; (918) 825-4844; voice technical support (918) 825-4844; fax (918) 825-6359.
  http://www.viagrafix.com
  email: sales@viagrafix.com

AIRFOIL DESIGN, ANALYSIS AND PLOTTING

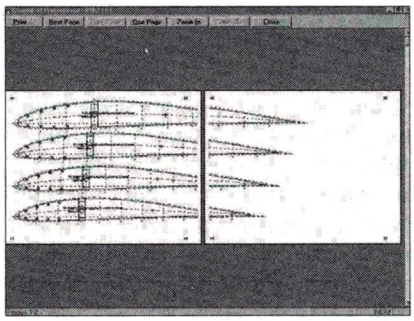
■ "Plane Geometry"—ver. 2.0

- Spreadsheet template for measurement and design of airplane geometry.
- Any computer that runs Microsoft Excel ver. 4 or higher.
- All printers supported by Microsoft Excel.
- Two programs in one: "Measure" generates geometric characteristics from aircraft dimensions or drawings, or actual airplanes may be used; "Design" generates aircraft dimensions from geometric characteristics. Easy to use. Interactive 3-D plot permits "design by eye"; 3-D plot of airplane may be viewed from any angle. Conventional and V-tail designs accommodated. Calculates wing and tail areas, aspect ratios, mean aerodynamic chords, taper ratios, equivalent dihedral. Estimates key stability and control characteristics. Includes a broad database of existing designs. Detailed instructions included.
- Flexible, open architecture provided by the Excel spreadsheet format. No other model program provides the capabilities of "Plane Geometry."
- $19.95 (checks only, CA residents must add sales tax; foreign checks accepted in currency equal to $19.95).
- Blaine Beron-Rawdon, Envision Design, 4207 Exultant Dr., Rancho Palos Verdes, CA 90275.
  email: evd@netcom.com
  Limited email/regular mail support; no phone support.

AIRFOIL DESIGN, ANALYSIS AND PLOTTING

■ CompuFoil Professional

- Airfoil plotting and modification software.
- IBM 286 with DOS 3.1, or higher, 520K conventional free memory or IBM 386 running Windows 3.1 or '95 with 8 meg memory.
- Any device supported by Windows.
- Prints full set of ribs for built-ups, complete with spar slots, jig holes, sheeting, leading edges in straight taper, elliptical, or modified elliptical planforms; foam templates with leading edges, ramps, wire kerf compensation, sheeting; leading-edge shaping guides. Calculates panel volume, surface area, projected area, weight estimates for foam panels. Onscreen preview; DXF output capability for CAD programs. Built-in CAD utility for direct airfoil editing, or use full host of modification functions such as change camber, thickness, max. thick location, etc.



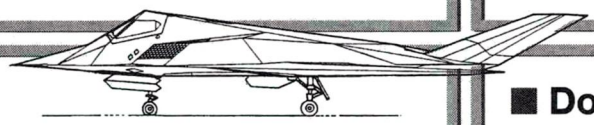
- The Windows version is the most versatile airfoil program available today. Used by major model manufacturers, NASA, universities and hobbyists worldwide.
- $35 to $118 depending on purchase options (add $4 S&H).
- Eric Sanders, 3904 Traine Dr., Kettering, OH 45429; phone/fax (513) 299-7684; (7 to 11:30 p.m. EST). Download demo at: homepage:http//ourworld.compuserve.com/homepages/compufoil
  75356.341@compuserve.com
  email: compufoil@aol.com

■ Airfoil-ii

- Airfoil design and analysis.
- IBM PC, XT, AT, or compatible with CGA, EGA, VGA, Hercules, or compatible graphics adapter.
- Many dot-matrix printers and HP LaserJet.
- A collection of low-speed-airfoil-analysis design tools, including: velocity distribution along the airfoil surfaces; boundary-layer development diagram that gives a quick visual check on laminar-turbulent transition; lift-drag polar that gives a summary of airfoil performance. The analysis can be viewed on screen or printed.
- By comparison with wind-tunnel data, the Eppler analysis used in Airfoil-ii has been demonstrated to provide accurate analysis for many, if not most, airfoils.
- $395—full program, $10—demo disk.
- Airware, P.O. Box 295, Canton, CT 06019; (203) 693-8635.

■ Eppler Airfoil Design and Analysis Code—ver. 3/10/95

- Airfoil design and analysis, including sailplane performance.
- IBM 8086 or higher.
- HP LaserJet and PostScript-compatible laser printers.
- Conformal-mapping method for design of airfoils with prescribed velocity-distribution characteristics. Panel method to analyze the potential flow about given airfoils. Boundary-layer method, so airfoils with prescribed boundary-layer characteristics can be designed, and airfoils with prescribed shapes can be analyzed.
- Multi-point design capability.
- $1,700; write for free brochure.
- Somers and Maughmer Inc., 601 Cricklewood Dr., State College, PA 16803-2111 (sole U.S. distributor).



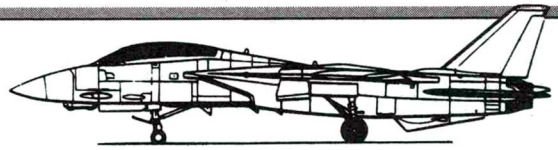
■ Foil 1.2

- Airfoil plotter: create, display, print airfoils.
- Any Macintosh with System 6 or greater.
- Any Quickdraw printer.
- Creates, displays and prints NACA 4/5 airfoils; large library of airfoils, including NACA 6, 7 and 8 series. Variety of viewing options; scanning feature to derive coordinates from scanned airfoils. Reads and writes airfoils to text files or Mac pict. files.
- Free; runs on a Macintosh.
- Available on the Internet and America Online. Look in the Aviation Forum on AOL and on popular Mac sites on the Internet. Gregory Payne, Aerometrics Inc., 755 N. Mary Ave., Sunnyvale, CA 94086.
  FTP: wustl.wuarchive.edu
  email: greg@aerometrics.com

■ Dot Matrix Plotter

- Design and other utilities: print drawing to multiple pages.
- IBM-compatible.
- IBM- and EPSON-compatible dot-matrix printer.
- Advanced plotter file printing system for IBM/Epson-compatible dot-matrix printers. *Automatically* prints large drawings to multiple pages. AutoCAD, Autosketch, CadKey, DesignCAD, DrafixUltra, Envision It, Generic CADD, Micro Cadam, ModelCAD and TurboCAD HP-GL plotter files are supported.
- $99.95—Modelers' Combination, $144.95—with Scanover.
- CAD-ART Systems Ltd., 4801 45 St, St. Paul, Alberta, Canada T0A 3A3 (403) 645-3248. Paul Matt's scale airplane drawings available in Scanover TIFF format, licensed to Windsoft Co.; distributed by Bob Holman Plans, P.O. Box 741, San Bernardino, CA 92402; (909) 885-3959; fax (909) 889-9307.

■ Winfoil—ver. 2.1



- Wing design, airfoil plotting; shareware.
- IBM PC 386 DX, 4MB RAM, mouse, VGA, 4.5MB disk space.
- Any Windows-supported printer.
- Airfoil and wing-plan plotting; wing and tail design; on-screen plotting of wing designs and airfoils; airfoil lift and drag data storage; airfoil polar plotting; wing-design wizard. Calculates wing area, aspect ratio, mean aerodynamic chord. Static stability and Reynolds number graphs. Spar design capability; import Eppler, SoarTech airfoil, airfoil lift and drag data; DXF export. Powerful airfoil query facility.
- Wing-design capability. Design wing any shape. Recalculate rib lengths automatically. Analyze performance of airfoils and verify performance with design.
- $A40 (Australia/New Zealand); $A50 (all other countries)—bank check or international money order. Unregistered demo available free.
- Malcom Hardy, 6 Tiibooburra St., Engadine, NSW 2233 Australia.
  100244.2132@compuserve.com
  http://www.ozemail.com.au/~malhardy;
  email: malhardy@ozemail.com.au
  Will respond on CompuServe. Free support to registered users.

■ NACA Generator—ver. 1.3

- Generates 4-, 5- and 6-digit NACA airfoil coordinates.
- IBM 286 with VGA graphics (EGA version available on special request).
- N/A
- Point-and-click interface. Produces eight of the NACA 6-digit laminar-flow airfoils (63, 64, 65, 66, 67, 63A, 64A, 65A series) in your choice of thickness and lift coefficient, 5-digit airfoils (210, 220, 230, 240, 250, 221, 231, 241, 251) in your choice of thickness, and 4-digit airfoil of cambers from 0 to 8 percent, camber positions from 10 to 90 percent in your choice of thickness.
- The only commercially available, stand-alone program that can produce the NACA 6-digit airfoil coordinates; built-in airfoil preview mode.
- $18 ($2 S&H).
- Eric Sanders, 3904 Traine Dr., Kettering, OH 45429; (513) 299-7684; (513) 299-7684 (7 to 11:30 p.m. EST).
  homepage:http//ourworld.compuserve.com/homepages/compufoil
  75356.341@compuserve.com
  email: compufoil@aol.com

■ Hans-Walter Bender Airfoil Encyclopedia

- Airfoil design and analysis.
- IBM 386 or higher running Windows 3.1.
- Any Windows-supported printer.
- This incredible airfoil-coordinate data bank contains 2,435 sets of airfoil coordinates. If data has been published on an airfoil, it's in this program. Also available is a powerful Windows program by Ludwig Wiechers; it displays, combines, blends and plots airfoils.
- The Windows program calculates and displays velocity distributions around airfoils.
- $145—Bender collection; $120—Windows program; $240—both.
- Soartech Journal, c/o H. A. Stokely, 1504 N. Horseshoe Cir., Virginia Beach, VA 23415; (804) 428-8064.

PERFORMANCE ANALYSIS AND PREDICTION

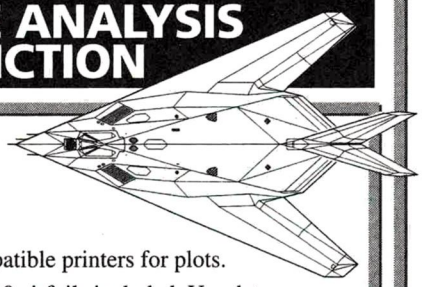
■ Area10 ver. 1.0

- Design and other utilities: wing area/wing-loading calculator.
- IBM 286 or higher.
- Dot-matrix and HP LaserJet.
- Quick and easy-to-use wing area and wing-loading calculations for models of any size. Automatic calculation of mean average chord (MAC). Displays and prints a spreadsheet that plots wing loading for a range of gross weights. All data can be printed on both dot-matrix and laser printers.
- No other similar program available.
- $12.95 ($5 S&H).
- Vortac Mfg. Co., P.O. Box 469, Oak Lawn, IL 60453; phone/fax (708) 425-5885.

■ Electro Flight Design

- Electric-model-performance prediction.
- IBM 386 running Windows 3.1 (currently working on MS/DOS version).
- Any Windows-supported printer.
- Calculates model drag and required horsepower, electric motor performance, optimum propeller for any flight regime and performance over flight regime for selected propeller.
- Includes a motor library of accurate data. Works with any gear box, any gear ratio.
- $69.50.
- Bob Kress, Kress Jets Inc., 500 Ulster Landing Rd. Saugerties, NY 12477; (914) 366-8149; fax (914) 366-5975. Tech info/support: John Kress (914) 366-4629.
  76460.3715@compuserve.com
  email: johnk8207@aol.com

PERFORMANCE ANALYSIS AND PREDICTION



■ PC-Soar—ver. 3.5

- Sailplane-performance predictor.
- IBM PC 8088 or higher.
- Virtually any printer for text; graphics-compatible printers for plots.
- Online documentation. Five sailplanes and 10 airfoils included. Use data provided, or enter your own. Imperial/metric capabilities. Reynolds-number effects calculated. Plot sink rate versus flying speed. Plot lift/drag versus flying speed. Overlay plots for comparison. Calculate design parameters such as area, aspect ratio, aerodynamic center, average chord, tail volume, instability factors, equivalent dihedral recommended, CG limits and more.
- Compare flight performance and stability of up to four models on the screen. Color-coding of graphical information. Add a new model; use models in library.
- $40—PC-Soar; $15 each—Libraries (59 sailplanes and 271 airfoil polars)—$3 S&H.
- LJM Associates/Lee Murray, 1300 N. Bay Ridge Rd., Appleton, WI 54915-2854; (414) 731-4848 (after 5:30 p.m. weekdays). 74724.65@compuserve.com

■ Electric Prop Model Design

- MS/DOS propeller analysis.
- IBM 286 or higher.
- Any printer.
- Two BASIC programs that provide extensive propeller analysis based on your input.
- $79.50.
- Bob Kress, Kress Jets Inc., 500 Ulster Landing Rd., Saugerties, NY 12477; (914) 366-8149; fax (914) 366-5975. Tech support: John Kress (914) 366-4629. 76460.3715@compuserve.com email: johnk8207@aol.com

■ Ducted-Fan-Performance Prediction

- Performance prediction for fuel-powered ducted-fan models.
- IBM 286 or higher, MS/DOS (Windows version coming).
- Any printer.
- Input the fan physical characteristics, the atmospheric conditions, the motor power curve and inlet characteristics, and the program will estimate the performance of the fan installation.
- A program rewrite is in the works and will probably be available by the time you read this.
- $59.50.
- Bob Kress, Kress Jets Inc., 500 Ulster Landing Rd., Saugerties, NY 12477; (914) 366-8149; fax (914) 366-5975. Tech support: contact programmer John Kress (914) 366-4629 (voice). 76460.3715@compuserve.com email: johnk8207@aol.com

■ Sailplane Design Performance Analysis—ver. 3.4

- Performance analysis.
- IBM 8086 or higher.
- Any printer.
- David Frasier's model-sailplane-performance analysis program allows the user to vary the airfoil, wingspan, wing area and CG to determine their effects on flight characteristics. Frasier was the instrumentation engineer who worked with Michael Selig and John Donovan on the Princeton Low-Speed Airfoil tests. He was killed in an aircraft accident in 1992.
- Included are the Princeton wind-tunnel test data and several aircraft parameter files.
- $35 (U.S), $37 (elsewhere).
- Soartech Journal, c/o H.A. Stokely, 1504 N. Horseshoe Cir., Virginia Beach, VA 23451; (804) 428-8064.

■ AERO*COMP

- Performance analysis; for electrics (ver. 3.1-E) or gas and glow (ver. 1.0-G).
- IBM 8086 or higher; no mouse required; math-co-processor-supported but not required. Runs under DOS and Windows 3.1 and '95.
- Any printer.
- Experiment to maximize your airplane's performance on a computer rather than on the workbench. Select the best motor, engine, propeller, gear ratio, batteries, aircraft design and weight. Maximize rate of climb, airspeed and flight duration.
- Extensive engine and motor data, with capability for user to add data. Ability to change one parameter at a time. Accurate calculations at high rpm and high airspeed. Online help screens.
- $79 (plus S&H).
- Hobby Lobby, New Creations R/C, or the publisher: USR&D Corp., P.O. Box 753, Hackettstown, NJ 07840-0753; (908) 850-4131.

■ Sailplane Design—ver. 4.0

- Sailplane performance analysis.
- IBM PC XT running DOS, CGA, EGA, VGA graphics optional; (printer optional); most dot-matrix printers supported.
- Generates L/D and sink rate versus velocity curves for sailplanes. Princeton airfoil data can be used in analyses. Multiple performance curves can be generated to show the effect of adding ballast or moving the CG. Wing geometry can be specified in up to five segments per half span.
- Accurate wing-drag data is calculated for each wing segment and combined to get an overall wing-drag coefficient.
- $25 (U.S.), $30 (elsewhere).
- The Soaring Edge, Edward J. Dumas, 3220 Boomerang Lane, Knoxville, TN 37931; (423) 690-3180.

■ Max-Soar—ver. 3.0

- Performance analysis.
- Macintosh with hard disk and HyperCard version 2.1.
- All Macintosh-compatible printers.
- Online documentation; includes five sailplanes and 10 airfoils. Use data provided, or enter your own; Imperial/metric capabilities; Reynolds-number effects calculated. Plot sink rate versus flying speed. Plot lift/drag versus flying speed. Overlay plots for comparison. Calculate design parameters such as area, aspect ratio, aerodynamic center, average chord, tail volume, instability factors, equivalent dihedral recommended, CG limits and more. MaxSection plotter included.
- Sailplane Design Library includes 51 popular sailplane types. Airfoil Section Library includes 228 wind-tunnel and theoretical polars from MTB, SoarTech and Althaus.
- $70—MaxSoar (includes MaxSection); $15 each—Libraries.
- ImagiSoft, John Hohensee, 648 Martin Dr., Cedarburg, WI 53012; (414) 375-9664. 76571.163@compuserve.com

MISCELLANEOUS

■ Member Master

- Club management: club roster and dues payment.
- IBM 8088 or higher, color only, hard disk recommended.
- Any printer.
- Allows entry of club member information, including your choice of affiliations. Supports tracking of dues payment for various membership types. Prints full and abbreviated club rosters and mailing labels. Provides dues payment history and shows each member's dues payments to date.
- $32.95.
- Chandero Systems Inc., Robert A. Blaney,14 Parkview Rd., Long Valley, NJ 07853; (908) 852-2674. 73157.3543 @compuserve.com

■ Pattern Master

- Design and other utilities, materials-cutting optimizer.
- IBM 80386, Windows 3.1, VGA graphics.
- Any dot-matrix or laser printer.
- Generates cutting patterns for flat sheet materials (any sizes), so it reduces waste of balsa sheet and wing-covering materials. Allows stock sheet inventory for many materials and order entry for required pieces. Displays and prints cutting diagrams. Online documentation and tutorial.
- Windows software—fully graphical. Unlimited number of pieces can be cut.
- $70 (free demo version); send SASE for descriptive brochure.
- Chandero Systems Inc., Robert A. Blaney, 14 Parkview Rd., Long Valley, NJ 07853; (908) 852-2674. 73157.3543@compuserve.com email: www.world2u.com/chandero

■ Mag-Track

- Magazine article finder.
- IBM 8086 or higher; needs only a floppy drive and text screen.
- Any printer.
- Finds articles in your personal library by indexing those you may want to refer to again. The data entered includes article title, author, publication, issue and page. Search for an article online, or print a list of indexed articles. This is a public domain program previously published in text form. For those who do not wish to type in the 120 lines of BASIC code, the program is available on diskette.
- Diskette includes documentation, BASIC source code and compiled version of MAG-TRACK program.
- $9 (specify disk size and density).
- Jim Harrigan, 103 Highland Ave., Rensselaer, NY 12144-1006. 70254.361@compuserve.com

■ 3D Express

- 3-D photographic modeling.
- IBM 486 with 8MB RAM (4MB).
- Any Windows-supported printer.
- Will create a complete 3-D image from two or more photographs.
- $495.
- 3rd Dimension Technologies, Technology Advert. Assoc., 3122 LaBaza Dr., Ste. 107, Westlake Village, CA 91362; (800) 455-3558; have their own BBS for licensed owners.

■ KelComp

- Airfoil plotter.
- Any DOS machine.
- Any printer.
- Prints any size of NACA 4- and 5-digit airfoils; can also list the coordinates of the airfoils.
- $15 (shareware).
- KelComp, 2200 Jamaica Blvd., S. Lake Havasu City, AZ 86406; (520) 453-2905; email: kelcomp@juno.com.

MODEL AIRPLANE NEWS **HOW TO**

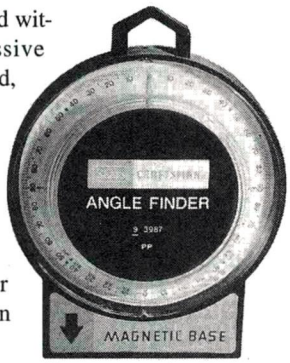
A few degrees can make the difference

Set Proper Wing Incidence

by JIM SANDQUIST

Model airplanes, especially biplanes like my Bob Dively* Super Stearman shown here, require proper wing incidence to fly safely. Setting the angles on a new model can be intimidating, but the correct tools and techniques make the job easy.

WE'VE ALL been at the field and witnessed that less than impressive maiden flight. The plane takes off and, as it leaves the ground, it rolls to one side or the other and requires a lot of aileron trim to stop the roll. Maybe as it leaves the ground, it climbs dramatically, or it requires excessive elevator just to get off the ground! It's possible that the wing or the stabilizer incidence hasn't been properly set.



You can purchase an inexpensive angle finder at a hardware store.

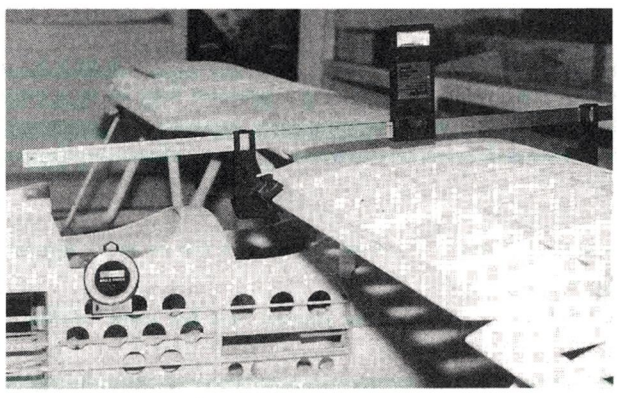
If you want to take the time to make a saddle to mate with your wing, the angle finder does a good job of establishing the wing incidence.

Most of us get started in the hobby with a trainer of some sort. Today's trainer kits usually make it pretty hard to set your wing and stabilizer incidence incorrectly. As you progress to building more difficult kits, it's not always easy to set the incidence correctly.

WHAT IS INCIDENCE?

Simply put, incidence is the angle of attack of the wing (or wings) and the stabilizer as it relates to the thrust line of the aircraft. All models have a thrust line. As a general rule, if you draw a line on any set of plans through the center of the propeller shaft and carry it through to the end of the fuselage, this will be the thrust line. For airplanes to fly properly, the wing and stabilizer's relationship to the thrust line must be set correctly. On some planes, the wing and stabilizer are set at zero degrees relative to the thrust line. On others, the incidence is set a degree or two positive to the thrust line. On biplanes, it's not uncommon to have the bottom wing set at zero degrees relative to the thrust line while the top wing is set at a positive angle to the thrust line.

An airplane that has its wings or horizontal stabilizer incorrectly set in relation to the thrust line will not fly as well as an airplane that has the correct settings. You can often make the plane fly correctly by dialing in some trim, but as your aerobatic flying skills improve, you'll begin to notice the adverse effects that inaccurate incidence settings have on your plane. Setting incidence isn't difficult, and it only adds a little more time to the building process. The result will be a smoother flying plane that will be more enjoyable to fly.



In this photo, I've blocked the tail up so that the thrust line is set at zero degrees. The angle finder is sitting on a stringer that runs parallel to the thrust line. The Robart Incidence Meter is on the wing, and it shows that the top wing has the required 4 degrees incidence.

TOOLS TO MEASURE INCIDENCE

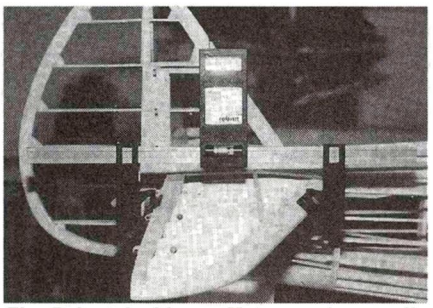
To set up my airplanes successfully, I use two instruments—an angle finder and the Robart* Incidence Meter. Both tools measure a positive or negative angle as it relates to a level surface (in this case, the thrust line). The angle finder is inexpensive (about $5 at hardware stores), but it can be tedious to use. To use it on a wing or a horizontal stabilizer, you

This close-up view shows how easy it is to read the Robart Incidence Meter. Accuracy is possible to within ½ of a degree!

have to make an airfoil pattern and a base on which to rest the angle finder. The Robart Incidence Meter, however, can be quickly mounted on any flying surface. In addition to measuring incidence, it also detects wing washout or washin and engine offset. It costs about $35, and it's well worth the investment.

HOW TO MEASURE

First, establish your thrust line, which should be on the plan. If it isn't, then you should draw one. Put your airplane on the bench on its landing gear with the wing mounted on the fuselage, and block up the tail until the thrust line is at zero. (Refer to your plans; often, at least one stringer or another portion of the fuselage will be parallel to the thrust line). The thrust line can be measured with either of the tools I've mentioned or even a small level. Once the airplane is level, the rest is easy! Slide in the V-blocks on the Robart Incidence



The Robart Incidence Meter works equally well on the horizontal stabilizer.

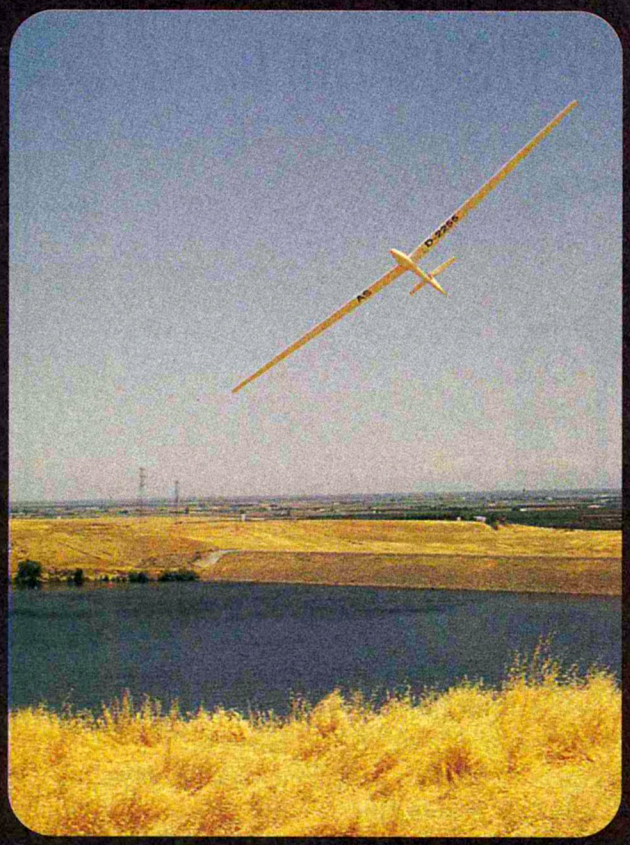
Meter until they rest snugly against the wing's leading and trailing edges. The wing incidence can be read on the meter, e.g., +2 degrees means the wing has positive incidence (the leading edge of the wing is higher than the trailing edge); -2 degrees means the wing has negative incidence (the leading edge of the wing is lower than the trailing edge). Refer to your plans or instruction manual. If they call for a positive 2 degrees of incidence, your wing is correct. If you have negative incidence, you'll have to shim the wing to achieve the proper incidence.

The procedure for checking the incidence of the horizontal stabilizer is exactly the same as that of the wing.

Establishing the proper incidences plays an important part in how well your airplane will fly. Take the time to set them properly. You will find that your planes will fly better and that maiden flights will be much more relaxed. You may also find that you're a better pilot than you think!

**Addresses are listed alphabetically in the Index of Manufacturers on page 122.*

Soaring, California style...



A modern scale ship soars over the reservoir.

Los Banos

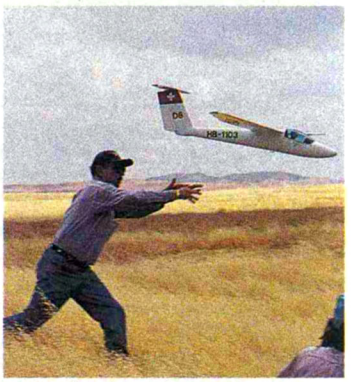
Slope Scale Soar-In

by JOE CHOVAN

IF YOU want to sample a great slope-soaring scale meet, the Los Banos Slope Scale Soar-In is sure to please. This year, 61 registered pilots assembled on May 17 to 19 in Los Banos, CA, for three days of camaraderie, beautiful models, great hills and generally favorable winds. The third annual event was sponsored by the South Bay Soaring Society.

The meet's organizers set out to create a casual atmosphere to encourage fun and participation and to attract builders and fliers of all levels. An aero-towing exhibition was held on Sunday, and several pilots took part in this unique brand of soaring that is gaining widespread popularity.

THE HILL



A weekend participant launches a Pilatus B-4.

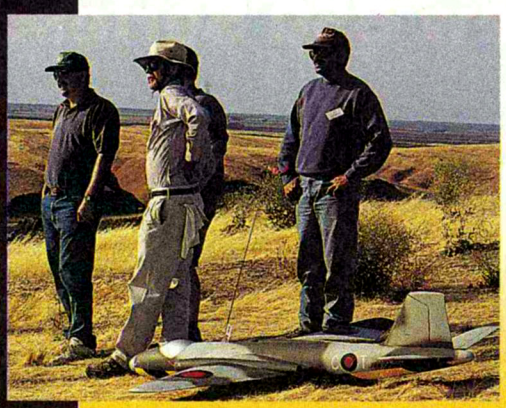
PHOTOS BY DAVE GARWOOD AND JOE CHOVAN

The Los Banos Reservoir area boasts some of the nicest hills in California. They provide a combination of good lift and great landing zones. The reservoir is nearly surrounded by moderately steep (roughly 45- to 70-degree) inclines topped with gently rounded edges that slope up to expansive grassy flats several hundred feet above the water. The hills are covered with foxtails, which manage to find their way through any loosely knit fabric you may be wearing. A smart pilot wears leather boots or stockingless sandals to avoid a half-hour sock de-seeding session after retrieving a downed plane. Pilots should be thankful that the hills are devoid of cacti and most other aggressive plants.

Being an inland site, the Los Banos Reservoir channels a varying combination of prevailing winds and thermal activity up the sloping sides of its banks. This provides a steady lift source, especially in the evening. We found daytime thermal activity on Friday somewhat fickle, but winds blew strongly on Friday night, all day Saturday and most of Sunday. As assistant event director Sean Sharif noted, strong winds do not always mean good lift. I found Los Banos to have very smooth air and healthy lift for vertical maneuvers.

THE DICHOTOMY OF SCALE MODELERS

Since this event was billed as a scale meet, it was emphasized from the onset that only scale planes would be permitted. The most noticeable difference in tastes could be observed in the performances of two very different types of aircraft, loosely named modern scale and power slope scale (PSS). PSS fliers often refer to the former as "white wings," while members of the former group call the PSS crowd "shredders" or "slope rockets."



Modern scale planes with their 3- or 4-meter wingspans fly and roll slowly and much more gracefully and realistically than most small PSS planes. When you see a

large modern or vintage glider fly, it's very difficult not to be impressed with the angelic quality these streamlined, beautiful craft possess. The action seems to unfold slowly, but you must remember that these are big planes, and they are still traveling rather fast. Consequently, a great deal of airspace is required to maneuver.

Lynsel Miller's vintage scale TG-3 flies over the Los Banos Reservoir.

Lynsel Miller launches Tom Overton's 1/5-scale BF-109. Lynsel built this 35-pound fighter using a D&W Aircraft* fuselage and canopy.

While there are several types of PSS planes, the kind least compatible with the white wings are the small, 48-inch-span WW II fighters. Their wing loadings far exceed those of most powered gas models (20 to 40 ounces per square foot). Piloting a plane of this type requires that you manage energy, and the maneuver of choice is usually the double-stall turn. Planes travel through the high-lift zone near the edge of the hill, pull up to convert speed to altitude and reverse direction after a stall turn to repeat the maneuver in the opposite direction. If a plane is ballasted sufficiently, it can achieve hundreds of feet in vertical development and speeds over 100mph. Fliers from the Inland Slope Rebels (ISR) have mastered this technique and showcased it with blistering excitement and fury. These pilots relish close-formation flying and blinding roll rates, and midair collisions are quite common. "Combat pilots always have plenty of glue," says Dave Sanders of Dave's Aircraft Works*. Mike Wofford of ISR remarks, "There's always a chance you won't bring a plane back in one piece. It's exciting!"

Needless to say, this breed of PSS aircraft does not fly like modern scale gliders, so to keep peace among the participants, event director

Sean Sharif launches Lynsel Miller's own-design Canberra bomber. Lynsel earned first place in the PSS class pilots' choice with this 14-pound, 80-inch span model, which has an E205 root airfoil with an E374 tip. Lynsel adapted the unusually shaped canopy from an Extra 300.

Lynsel Miller did a remarkable job of scheduling flying time for each class and managing the periods of good lift to keep things fair and enjoyable for all.

CONSIDERING BIG WINGS?

While many find small gliders and PSS subjects easy to model, some are intimidated by the perceived space and cost requirements of the larger 1/5- or 1/4-scale gliders. As Brian Chan observes, "It takes a different sort of person to fly scale gliders."

I was very pleased to learn that not everyone has an innate fear of these large creations. Sheldon Cohen flew his Multiplex* ASW-22 very impressively. Sheldon started R/C modeling one year ago after being an avid free-flighter and caught the R/C bug when he won a plane in a California Slope Racers raffle after he volunteered to help run a race.

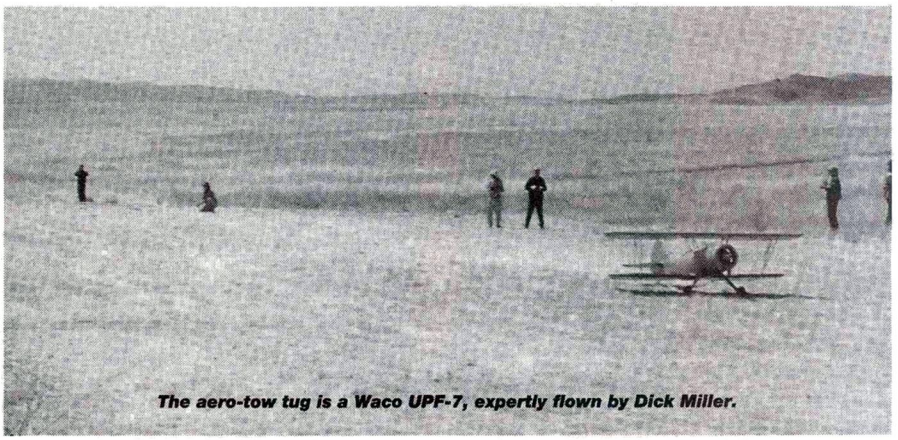
Many of the large kits can be taken apart for transportation. Joe Thomas remarks, "One-fifth scale looks just as good as 1/4 scale; both are very graceful." Joe flew a Multiplex DG-600 and likes the quality of these kits.

For years, there has been a shortage of modern scale kits in the U.S. Now, Robin Lehman and Mark Foster of Sailplanes Unlimited* import a variety of modern scale kits and make them available to modelers at cost! Robin wishes to help end the "dark ages" in America and considers aero-towing a great alternative to slope flying.

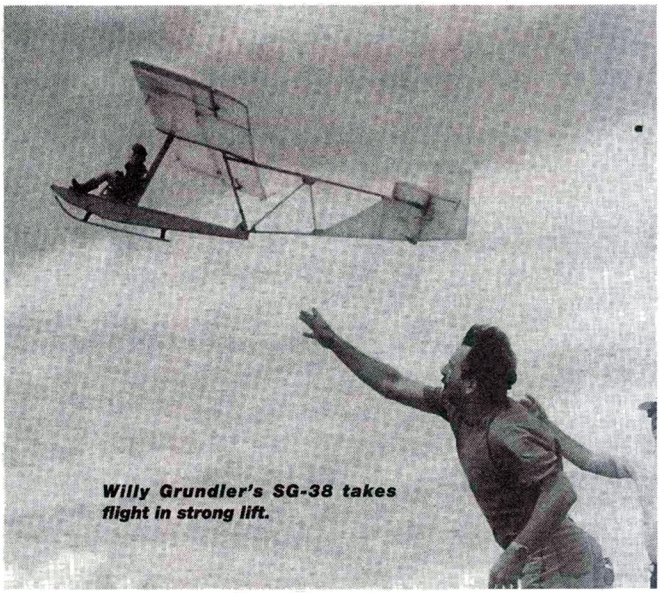
AERO-TOWING

As Sunday's exhibition proved, aero-towing is an enjoyable and realistic way to get a large sailplane to altitude. Dick Miller provided tows with his UPF-7 biplane powered by a 3.2 Sachs. The plane was built from Barrons plans.

Dick's advice for tow pilots is to use a plane that handles well, like his large bipe, and double its recommended power. Dick notes that while you're towing, communication is the key to success, and all moves should be smooth. In several years of towing, he has never lost a plane.



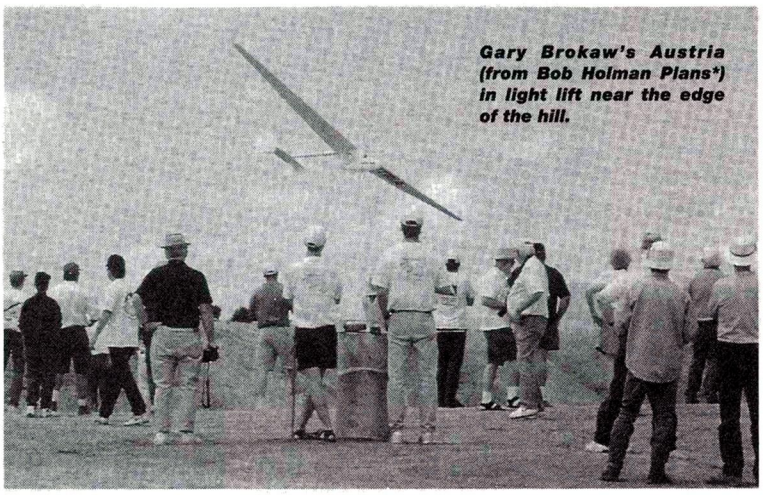
The aero-tow tug is a Waco UPF-7, expertly flown by Dick Miller.



Willy Grundler's SG-38 takes flight in strong lift.

A GREAT TIME OVERALL!

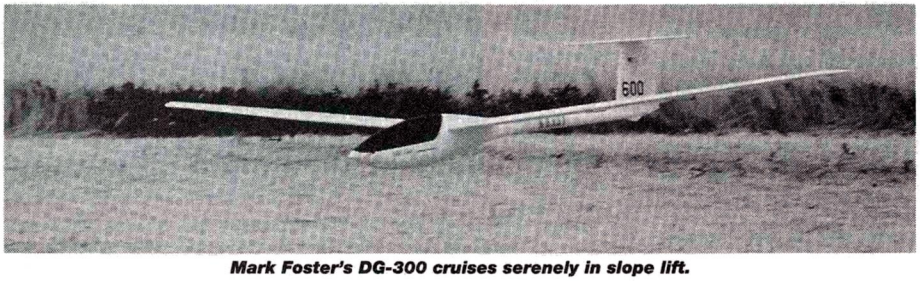
This was the consensus. During closing ceremonies, the winner for pilots' choice in modern scale was announced: Rick Briggs' LS-4. Lynsel Miller's Canberra was chosen for the PSS class, and John Raley's PWS-101 took the honors in vintage scale.



Gary Brokaw's Austria (from Bob Holman Plans*) in light lift near the edge of the hill.

While some reluctantly tore themselves away early to travel, others stayed for Sunday evening antics, and non-scale planes ventured into the air. ISR member/designer Carl Maas unleashed his Falcon flying wing and his fast Solaris. Carl impressed me with his skillful maneuvers and his willingness to let me fly one of his planes, despite having witnessed the way I flew my own.

As the sun set, a flock of Birdworks* Rubber Ducks darted in the cool evening breezes—a relaxing end to a memorable weekend.



Mark Foster's DG-300 cruises serenely in slope lift.

*Addresses are listed alphabetically in the Index of Manufacturers on page 122.

MODEL AIRPLANE NEWS

FIELD & BENCH REVIEW

Giant-scale unlimited aerobatics

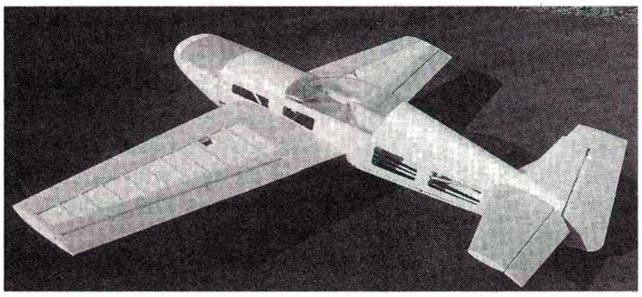
LANIER RC Extra 300S

by JIM ONORATO

WHEN Walter Extra introduced the full-scale Extras, chances are he had no idea that they would be among the most widely modeled aircraft in recent times. It seems as though every manufacturer has a kit of this great aerobatic performer, and Lanier RC* is no exception. It has a couple of them, and the subject of this review is its biggest—the 102.5-inch-wingspan, 33% Extra 300s.

THE KIT

The Extra 300s kit features Lanier's balsa, foam, ply and plastic (BFPP) concept, which has been so successful in its Laser 200 and Stinger series kits. But Lanier has made two significant improvements in the Extra: top-grade lite-ply



The completed Extra 300s ready to be covered.

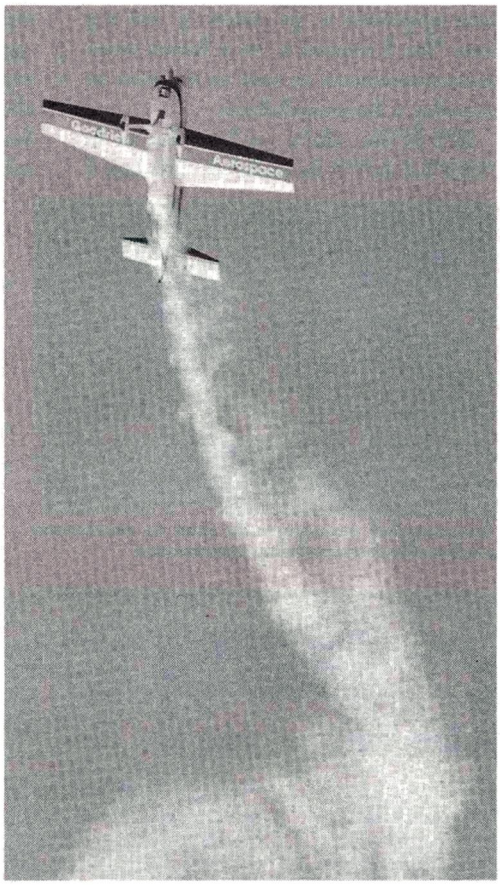
is used instead of lauan, and many of the plywood parts are laser-cut. The Extra has foam-core wings and tail feathers and a fuselage constructed of lite-ply, spruce and plastic. Like other Lanier kits, the Extra kit does not contain any hardware but provides a complete list of recommended hardware. For greater accuracy, the two sheets of rolled plans are CAD-generated. The 17-page instruction booklet has step-by-step instructions but does not include photos or sketches.

CONSTRUCTION

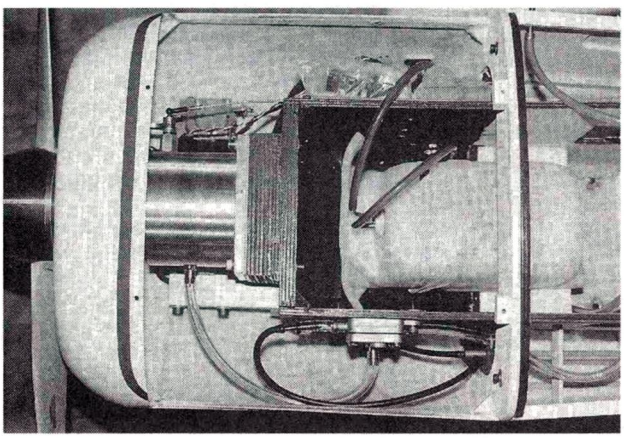
I used Great Planes* 6-minute and 30-minute Pro Epoxy on the plywood parts and Great Planes thin and medium pro CAs on the balsa and plastic parts. I attached the sheeting to the wing and tail-feather foam-cores with Zap* finishing resin, and I attached capstrips and spars to the foam-core wings with Precision Aviation Design's* Zippy white glue. I used Robart* Super Hinge points, Zippy Link control horns and 4-40 pushrods on all the control surfaces.

Wing. The wing-panel foam-cores are precut and have to be handled very carefully to avoid damaging the delicate, feathered trailing edges. The wing has a symmetrical airfoil and is level across the top and tapered on the bottom from the root to the tip.

I used Zippy white glue to glue in the fiber wing-spar tubes and the four ¼-square-inch spruce spars in each panel. When you install WR2 and WR3 (the parts that tie the fiber tube to the spars) in step 4, please note that the wider one goes on the top of the tube, not the bottom, as the instructions indicate.



The wing panels were partially sheeted with 3/32-inch balsa from the forward spar to the leading edge and from the rear spar to the trailing edge. I sprayed the leading-edge sheeting with ammonia and water to make sure that it would bend to fit the foam-core's curvature. I attached capstrips between the spars with white glue. These give the wing a built-up look when it's covered. A ½-inch hole from the wing root to the servo well is required for the aileron servo lead. I made one by using a sharpened ½-inch-diameter brass tube as a drill.



The engine, smoke system and fuel tank are easily accessible with the top cover removed.

Remaining work on the wing panels consisted of attaching the leading edges, the root and the end caps and cutting out the ailerons. The

SPECIFICATIONS

Model: 33% Scale Extra 300s

Type: competition, aerobatic sport aircraft

Manufacturer: Lanier RC

Designer: Bob Godfrey

Wingspan: 102.5 in.

Wing area: 1,868 sq. in.

Weight: 25 lb. (w/smoke)

Wing loading: 30.8 oz. per sq. ft.

Airfoil type: symmetrical

Length: 89.5 in.

Engine req'd: 3.7 to 6.4 2-stroke, 3.0 4-stroke

Engine used: Brison Aircraft 4.2ci 2-stroke gas

Prop used: Top Flite Power Point 22x10

List price: $659.95

Discount price: $375

Features: the Lanier RC Extra 300s kit includes laser-cut parts; foam wing panels with a fully symmetrical airfoil; plug-in wings with aluminum spar; a sheeted-foam tail assembly; vacuum-formed canopy; a hefty pre-formed aluminum landing gear; ABS turtle deck, hatch, cowl and wheel pants; built-up fuselage with die-cut lite-ply sides; and rolled full-size plans.

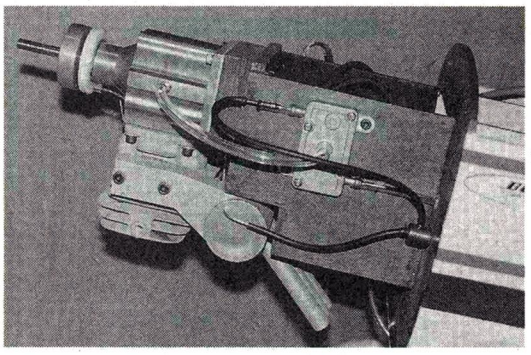
Comments: a balsa, foam, ply and plastic (BFPP) kit that's relatively easy to build; the kit features interlocking tabbed fuselage construction; a "go where you point it" type of airplane; great performance.

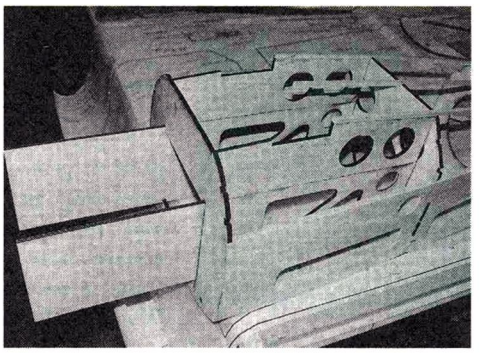
Hits

- Excellent flight performance and low-speed stability.
- Easy-to-follow plans and instructions.
- High-quality foam-cores and laser-cut plywood parts.
- Good overall appearance.

Misses

- Minor errors in instructions (corrected in later kits).



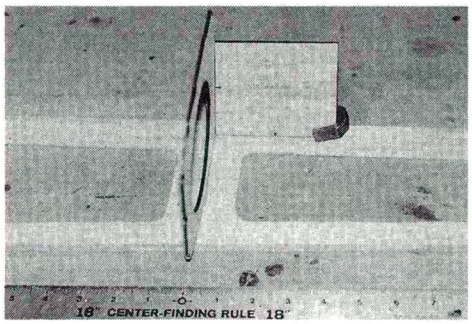


Left: for smoke, I ran a B&B Specialties smoke pump off engine crankcase pressure. Right: the fuselage sides are made of high-quality lite-ply, and the formers are laser-cut for a precise fit.

exposed aileron edges were then covered with balsa. For the ailerons, I used an 80-ounce DAD* Pro Plus servo in each wing panel. I completed the wings by installing two 3/8-inch anti-rotation dowels in each panel.

Tail group. The tail surfaces are foam covered with 1/16-inch sheet balsa, and they have a symmetrical airfoil. The instructions called for the stab halves to be sheeted first then butt-glued without any further strengthening. I was concerned about the strength of the butt joint, so following my conservative instincts, I made the following modifications: after I had drilled the holes for the elevator servo wires into each foam-stab half, I glued the halves together and applied a 1/2-inch strip of carbon-fiber tape lengthwise to the stab's top and bottom. Then I epoxied a 1 1/2-inch-wide fiberglass strip around the joint and applied the sheeting to the joined halves.

The elevator servos were installed in the stab much as aileron servos are installed in wings. (This is a really big airplane!) I used an 80-ounce DAD Pro Plus servo for each elevator half and a 130-ounce DAD Pro Flex servo for the rudder. The rudder servo was installed in the rear of the fuse with a pull/pull system that uses 4-40 pushrods.



This supplied gauge can be used to accurately position the formers during construction.

Fuselage. The fuselage sides are made of four pieces of die-cut lite-ply. Most of the other fuse parts are laser-cut lite-ply or plywood, and the longerons and stringers are 1/4-inch spruce. The laser-cut parts had been cut very sharply and accurately. A handy gauge is provided to set the bulkheads at the proper angle to the fuse side while they are glued. When I glued the second side of the fuse to the bulkheads, I inserted the aluminum wing spar through the sides to make sure that it was level and perpendicular to the fuse's centerline.

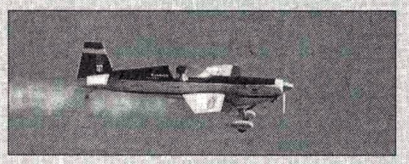
At this point, I deviated from the assembly sequence suggested in the instructions by building the front hatch and mounting the engine before I assembled the cowl. The cowl is made of ABS plastic and comes in three pieces: front, bottom and top cover. The cowl is attached to the fuselage from the front with four bolts that go through a 1/4-inch

FLIGHT PERFORMANCE

The first test-flight shoot took place on a beautiful sunny day with a 20mph wind blowing diagonally across the field.

• Takeoff and landing

After range-checking my radio with the engine at full throttle, I topped off the tank and fired up the Brison for the initial flight. My transmitter was set up so that low rate gave the control-surface throw recommended for regular flying and high rate gave about three-quarters of the throw recommended for hot-dog flying.



On the ground, the Extra felt firm and taxied nicely with no tendency to nose over. On takeoff, the tail lifted almost immediately, and the Extra tracked straight ahead without any right rudder. I let it roll about 75 feet then applied just a touch of up-elevator. The Extra lifted smoothly into the air with the wings perfectly level.

My first couple of landings left a lot to be desired. The Extra needs to be flown in under power because when the power is cut, it tends to drop fairly quickly. I'm sure that a little practice is all that is needed. After my first flight, I realized that I had not made any trim adjustments.

• Low-speed performance

At low speeds, the Extra is smooth and predictable. I took it to a safe altitude and reduced the throttle as I applied more and more up-elevator. The plane practically stopped in midair before it stalled straight ahead. It can be flown at a very slow speed without losing stability and can execute all but vertical maneuvers at part throttle.

• High-speed performance

At high speeds, the Extra is a "go where you point it" airplane. It tracks extremely well and is a smooth and stable flier. But I did encounter some rollout at the top and bottom of high-speed loops with full elevator deflection. The remedy was to reduce the elevator throw and ease back on the throttle as the plane came over the top of a loop.

• Aerobatics

What can I say? The Extra is a proven aerobatic airplane and is capable of every imaginable maneuver. Inside and outside snap rolls were incredibly fast and were done with the plane heading up, down and level; it didn't seem to make any difference. Axial rolls were fast and truly axial. Sustained knife-edge and outside 360-degree turns were no problem for the Extra. Spin recovery was within 1/4 spin when the controls were released. When I rolled the Extra to inverted flight, it flew hands-off just as straight as an arrow.

Though the Brison 4.2 was not large enough to give unlimited vertical performance (you probably need a 6.4 for that), it had sufficient power to haul the Extra straight up for about 200 feet and had no trouble with most other maneuvers. The Slimline smoke muffler and B&B Specialties smoke system worked flawlessly and produced beautiful plumes of thick, white smoke.

I used a pilot bust that looks like Patty Wagstaff.

plywood former (CW1) that is glued into the rear of the cowl. To line the cowl up perfectly with the prop shaft, I temporarily attached former CW1 to the fuse and trimmed the cowl's rear edge until everything fit properly. I had to build up the top edge of CW1 about 1/16 inch to make it flush with the top of F1 so that the cowl cover would be flush with the top of the hatch. I reinforced the inside of the cowl with fiberglass and attached the cover with eight button-head bolts and blind nuts. I liked the method used to mount the cowl on the fuse because none of the mounting bolts was exposed. If you don't like ABS plastic cowls, Lanier RC has an optional fiberglass cowl available.

The kit I received was one of the first produced, and the instructions contained a few minor errors in the fuse- and cowl-construction sections. I understand that most, if not all, of these errors have now been corrected.

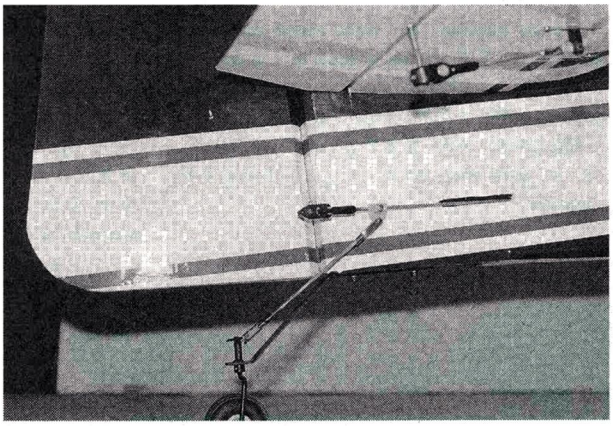
As well as the cowl, the wheel pants, front hatch and turtle deck are all ABS plastic and give the plane a sleek look without very much effort from the modeler. These parts were painted and attached after the fuse had been covered.

The wing panels slide onto an aluminum tube spar and are prevented from rotating by dowels that fit into holes in the fuse sides. The panels are held on the aluminum spar with 4-40 socket-head retaining bolts that go through a piece of 1/2-inch dowel in the top of the wing and are threaded into the aluminum-tube spar. I used a Robart Wing Incidence Indicator to set the wing incidence, which, by the way, is zero.

I chose a Brison Aircraft* 4.2ci gasoline engine and fitted it with a Slimline* giant-scale smoke muffler (part no. 2109S). This muffler has a 2-inch-diameter canister and reduces noise very effectively. I used a B&B Specialties* smoke system, which consists of a smoke fluid tank, smoke pump and valve. The pump is powered by engine crankcase pressure and feeds smoke fluid to the muffler without pressurizing the smoke-fluid tank.

FINISHING

I decorated my Extra in the 1995 color scheme that Patty Wagstaff used. I chose Insignia Blue, Missile Red and white Top Flite* MonoKote and Coverite's* 21st Century spray paint. Model Graphics* provided the graphics, and they are outstanding. Butch Andrews of Model Graphics very kindly gave me several photos of the 1995 version of Patty's Extra 300s so that I could get the color scheme and graphics just right. (Yes, the blue tail with white lettering is correct.) I used a 1/3-scale pilot bust that's a miniature of Patty herself. (Real neat!) The final touch was the addition of a 22x10 Top Flite Power Point prop and a 4-inch P-51-style Tru-Turn* aluminum spinner.



The finished tail group with 4-40 control rods and linkages in place. The rudder is pull/pull actuated by the servo that's in the aft of the fuselage and by the elevator servos mounted in the horizontal stab.

CONCLUSION

If you're looking for a really big airplane that won't cost you an arm and a leg, the Lanier RC 33% Extra 300s is for you. It's an easily built kit that looks great, is very aerobatic and has good low-speed stability. I thoroughly enjoyed building and flying this airplane and highly recommend it for advanced fliers.

**Addresses are listed alphabetically in the Index of Manufacturers on page 122.*

MODEL AIRPLANE NEWS

ENGINE REVIEW

Zenoah G-45

by MIKE BILLINTON

FOR LARGE-SCALE aircraft, heavy-duty industrial engines converted to suit model applications have considerable merit. These "workhorses" could be scaled down to make engines even smaller than the current 22cc Zenoah (the smallest)—but not without some difficulty!

The industrial-engine features are now well-known:

- Rolling-element bearings throughout.
- Main crankshaft with twin webs and twin output shafts.
- Very strong forged-steel connecting rod with needle rollers at either end.
- One-piece, aluminum cylinder/head casting that's hard-satin-chrome plated.
- Two-ring medium-expansion piston with 0.0035-inch skirt clearance and 0.006-inch crown clearance.
- Breakerless capacitor-discharge magneto fixed-setting spark-ignition system.
- A highly reliable diaphragm pumper carburetor that allows the fuel tank to be installed anywhere.

These features mean longevity under arduous, heavy-duty operation. Normal model engine structures have quite different attributes, i.e., they produce much higher rpm (in general), are much lighter and are available in a wide range of configurations to suit specific modeling classes. Distributed in the U.S. by ISC Intl.*, the Zenoah G-45 (45cc) 2-stroke exemplifies the heavy-duty approach. The major lower crankcase casting was produced by Komatsu Zenoah to his ideas (you can see his logo on the front of the crankcase).

MECHANICAL DETAILS

Around the engine's periphery, the standard, industrial-type crankcase has a variety of mounting bosses, none of which can handle high power/high rpm levels when harnessed to heavy propellers, often at long overhang distances. The G-45's rear four bosses are held on the bulkhead (or on the provided aluminum radial mount) with 6mm bolts. During my tests, they proved to be absolutely secure.

So, with its improved high-rpm balancing, this engine's vibration levels were markedly better than some other industrial engines I've tested. The G-45 easily approached 12,000rpm; other industrial units had problems at around 10,000rpm. The unusually low stroke/bore ratio of 0.720:1 may well help with this, though this also means a large bore of 1.694 inches (43.05mm) and a large piston that contributes towards a total crank/rod/piston assembly weight of nearly 1 pound (445 grams).

Designed with modeling in mind

At the front end of the engine, the flywheel magneto is much smaller than usual. With high-rpm, radially mounted, single-cylinder engines, anything that reduces firewall weight (and, consequently, inertia) is a bonus.

The cylinder-head block assembly weighs 11.3 ounces (320 grams) and is virtually indestructible; the aluminum-bore cylinder surface has been satin-chrome plated. At 8.04:1, the effective compression ratio is at least 1 unit higher than I've seen in other industrial test engines.

The combustion chamber is "bowler-hat" shape with the "brim" angled down 10 degrees.

Cylinder exhaust timings are 154 degrees (piston top), or, if the piston ring is taken as the real point at which cylinder-seal starts, 174 degrees. Transfer timings can be taken as 110 degrees or 130 degrees. The piston crown's 0.008-inch clearance must allow some gas leakage even when it expands with heat, so the real timing is somewhere between and will vary with how snugly the crown fits in the bore. (Tuned-pipe exponents might like to ruminate on the effects of the exhaust timing changing with heat as the pipe comes on song and the piston gets hotter and the piston-crown-to-cylinder-bore closes up!)

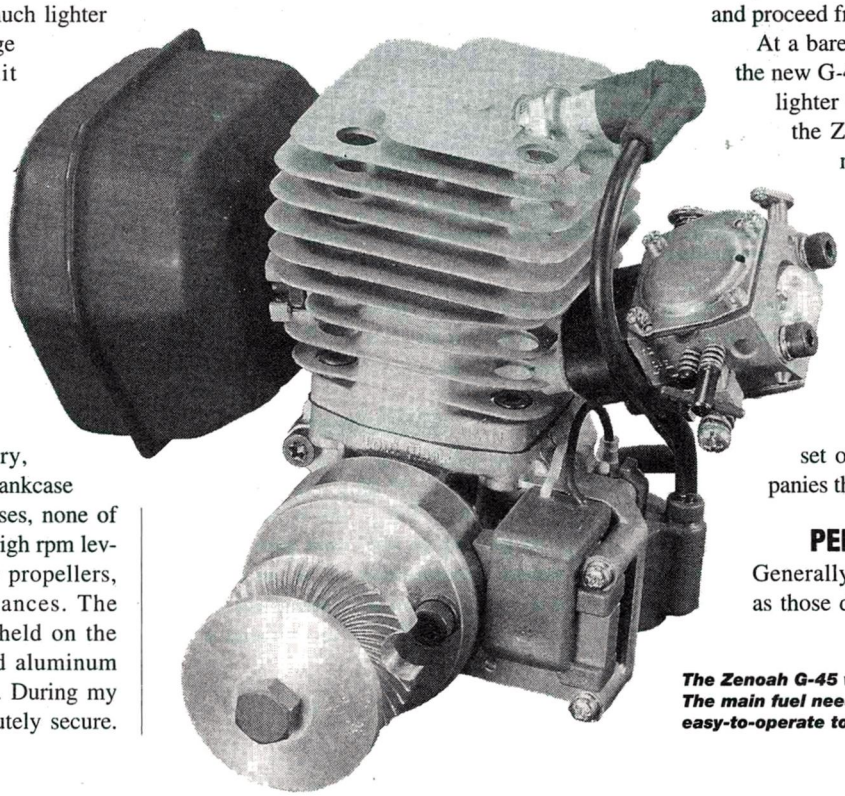
The Walbro carburetor's 15.2mm bore is somewhat larger than usual for this engine style; again, this indicates that a higher level of performance is expected. One welcome change is the reduction in main fuel-needle movement needed to span the "lean to rich" range: ½ to ¾ turn was enough. Many other industrial carbs need at least one turn in either direction before anything happens to rpm—almost too insensitive. I hardly had to use the useful butterfly "cold-start" choke, even in temperatures of around freezing. Leaving the choke fully closed more than 2 seconds or so usually caused the fuel mixture to be over-rich; it's best to move the choke to around ¼ open immediately after start-up and proceed from there.

At a bare weight of 4 pounds, the new G-45 is actually slightly lighter than its predecessor, the Zenoah G-38; but it's more than 50 percent more powerful—almost on a par with the popular and much larger G-62. Clearly, the G-45 could power quite large aircraft.

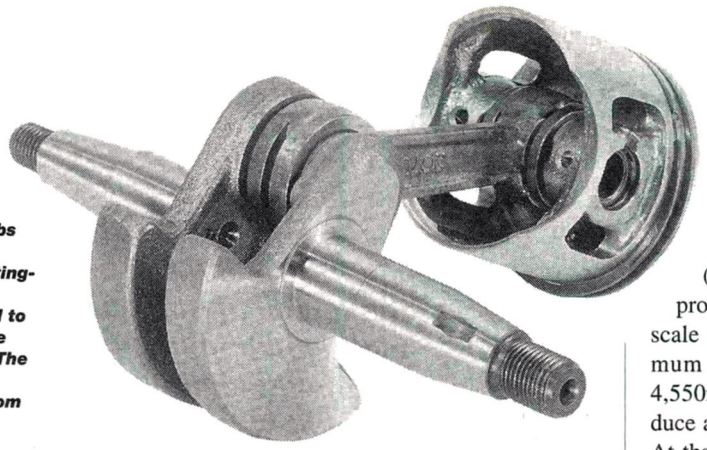
A comprehensive set of instructions accompanies this fine new engine.

PERFORMANCE

Generally, engine specs such as those described lead almost



The Zenoah G-45 with industrial muffler. The main fuel needle is fitted with an easy-to-operate tommy-bar.



The 2.2-inch-diameter twin webs counterbalance the large-bore piston. Hardened-steel connecting-rod ends run on needle rollers. The main strut is copper-plated to prevent it from becoming brittle during the hardening process. The piston bypass ports next to the wristpin help to transfer gas from the case to the cylinder.

instantly to high-power running with little need for the usual run-in period. The Zenoah G-45 seems to have a slightly "tighter" overall setup even when it has heated up. Even after around three hours of running, this hadn't changed. Perhaps this means that the engine really has a 1,000-hour operational life. Well, deadlines loomed, and there was no sign that extra running was changing anything, so it was time to move on.

I checked rpm with a considerable number of propellers; the G-45 started consistently well, and its performance was always totally predictable. It soon became obvious that it would cruise through my tests.

I checked seven setups: open exhaust; standard muffler; large-scale/large-volume muffler; Krumscheid silenced tuned pipe at four lengths (900mm, 550mm, 700mm and 470mm) to cover rpm maximum resonance from 4,500 up to 9,500. (To simplify things, my graph illustrates readings obtained with only the last two lengths; they give the essential info and leave the graph less cluttered.)

As usual, my tests became progressively more rigorous.

TEST PROCEDURES

1. Open exhaust. Fuel—96 percent unleaded gasoline with 4 percent synthetic automotive oil.

The maximum torque of 530 oz.-in. (3.78 Newton meters) is a 16-percent improvement over the G-38. At 11,460rpm, the engine was still charging up the rpm scale, but I decided to stop to ensure its survival for the work to follow. The b.hp maximum had already been reached at near 9,000, so decline was setting in anyway, and it was noisy inside the test shed!

2. Standard industrial muffler. Same fuel. The probable effect of this compact muffler's considerable restriction was easy to anticipate, and the graph clearly shows it: the lowest torque and hp figures of the tests. But, compared with the G-38, actual torque and hp values increased by 18 percent and 30 percent, respectively.

3. Practical Scale's large-volume muffler. Same fuel.

This unusually large (diameter: 3.2 inches; length: 5.5 inches), 12.5-ounce stainless-steel unit fits directly behind the engine with a special bulkhead, so it adds nothing to air resistance, but its cooling requires extra consideration.

Its small, 14 mm, outlet diameter was meaningful; in terms of sound and power, the muffler easily outperformed the industrial muffler figures of between 7,000 and 9,000rpm, but it still fell way short of open-exhaust performance levels.

4. Krumscheid tuned pipe at 900mm from exhaust flange to end of divergent cone. Same fuel.

Mainly for large engines, the pipes and mufflers made by Gunter Krumscheid Metallwaren of Menden, Germany, are acquiring a good reputation in Europe.

The pipe, header and flexible extension together weigh 18 ounces (510 grams). I expected this length to produce max. resonance well down the scale near to 5,000rpm. The actual maximum torque of 510 oz.-in. appeared at 4,550rpm, but physics intervened to produce a further peak just short of 9,000rpm. At that higher rpm, maximum hp was 4.1; at the aimed-for 5,000, only 2.34hp was available. There's a mathematical or "musical" logic behind these results; when you double or halve the resonance length, other things start to happen. Compared with the 470mm pipe, we get an inferior pulse of restricted power, but as the dyno shows, there is a pulse.

5. Krumscheid pipe at 700mm. Same fuel. This combination produced an impressive 560 oz.-in. of torque at slightly more than 3.55 b.hp. Statically propping for the mid-5,000 to mid-6,000 range puts this engine/pipe combination on its optimum power band. To achieve this, props such as 24x8 or 22x10 were found to be best—to be sure, a substantial piece of lumber for an engine of this size!

6. Krumscheid pipe at 470mm. Same fuel. To obtain this length and reach a 9,000rpm

RPM ON STANDARD PROPELLERS

	OPEN EXHAUST	INDUSTRIAL MUFFLER	T.C. MUFFLER	KRUMSCHEID T/P @ 700mm	TUNED PIPE @ 470mm
24x12 Airflow	4,160	–	–	–	–
24x8 Airflow	5,150	4,510	4,260	5,260	–
22x10 Menz	5,860	5,180	5,250	6,100	5,380
24x6 Airflow	6,540	5,890	6,260	6,530	6,630
20x10 Menz	6,840	6,360	6,370	6,660	6,810
21x10 Bolly carbon fiber	7,300	6,770	7,090	7,070	7,520
18x12 Menz	7,610	7,100	7,270	7,340	7,820
18x7 Mastro	8,610	7,910	8,200	8,100	8,980
20x6 Zinger	8,630	7,960	8,160	8,180	9,010
16x12 APC	9,380	8,850	9,030	9,050	9,690
PERFORMANCE EQUIVALENTS					
B.hp/ci	1.62	1.09	1.31	1.27	1.79
B.hp/cc	0.099	0.066	0.080	0.078	0.109
B.hp/lb	1.10	0.74	0.75	0.68	0.96
B.hp/kilo	2.44	1.64	1.66	1.50	2.11
B.hp/sq. in. frontal area	0.217	0.107	0.172	0.167	0.235
Oz. in/ci	192.70	149.10	167.30	203.70	198.20
Oz.-in./cc	11.76	9.10	10.20	12.40	12.09
Oz. in./lb	131.50	88.90	95.80	108.90	106.00
Ft. lb/ci	1.00	0.77	0.87	1.06	1.03
N.m./cc	0.084	0.065	0.073	0.089	0.086

USA DISTRIBUTOR: ISC Intl., 10620 N. College Ave. Indianapolis, IN 46280.

ZENOAH G-45

WEIGHTS AND DIMENSIONS

Capacity	2.7496ci (45.058cc)
Bore	1.694 in. (43.05mm)
Stroke	1.22 in. (31mm)
Stroke/bore ratio	0.720:1
Timing periods	Exhaust—154° (174° piston-ring closure) Transfer—110° (130° piston-ring closure) Sub-piston induction Opens—103° ABDC Closes—77° ATDC Total period—154° Blowdown—20°
Combustion volume	4.25cc
Compression ratios	Geometric—11.60:1 Effective—8.04:1
Exhaust-port height	0.409 in. (10.4mm)
Cylinder head	Modified "bowler hat" shape
Cylinder-head squish angle	10°
Squish-band width	0.460 in. (11.70mm)
Carburetor bore	0.596 in. (15.20mm)
Crankshaft diameter	0.5885 in. (14.96mm)
Crankpin diameter	0.5115 in. (13mm)
Propeller bolt	10x1.2 (a slightly loose fit)
Wristpin diameter	0.433 in (11mm nominal)
Connecting-rod centers	2.244 in. (57mm)
Height	5.83 in. (148mm)—bottom of crankcase to top of fins
Width	5.83 in. (139mm)—exhaust flange to carburetor 8.1 in. (206mm)—standard muffler to carburetor
Length	4.88 in. (124mm)—rear of crankcase to prop driver 7.08 in (180mm)—rear radial mount to prop driver
Radial mounting-hole dimensions	4 6mm holes at 54mm pitch-circle diameter
Exhaust-manifold bolt spacing	1.653 in. (42mm)
Frontal area	2.5 sq. in.
Weight	4 lb., 0.5 oz. (1,828gm)—bare 4 lb., 12.8 oz. (2178gm)—with large-volume muffler 5 lb. 2.3 oz. (2,334gm)—with tuned pipe 4 lb. 9.75 oz. (2,090gm)—with standard muffler 4 lb. 14.75 oz. (2,232gm)—with standard muffler and radial mount —of crankshaft/rod/piston: 15.65 oz. (445gm) —of piston: 0.65 oz. (19gm)

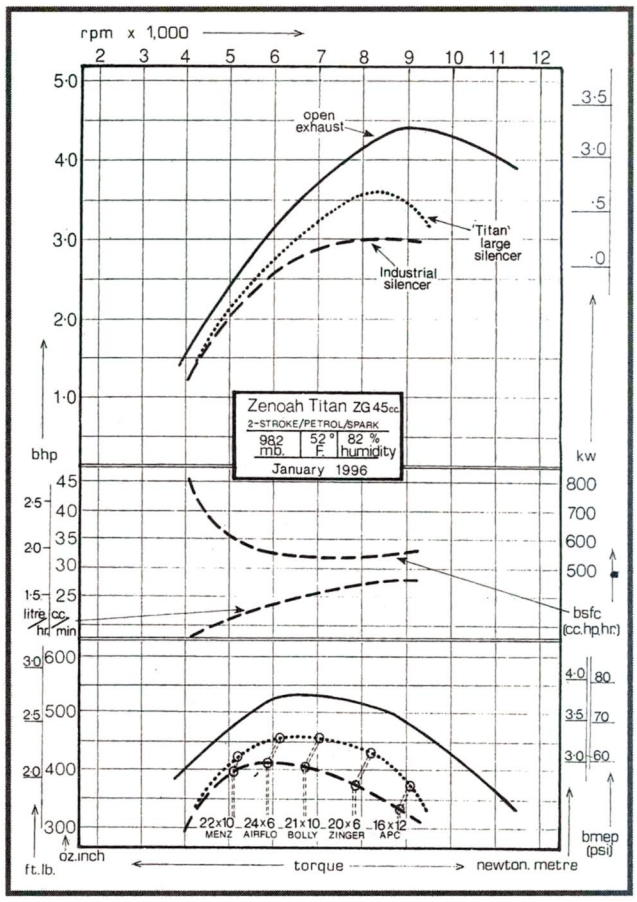
PERFORMANCE

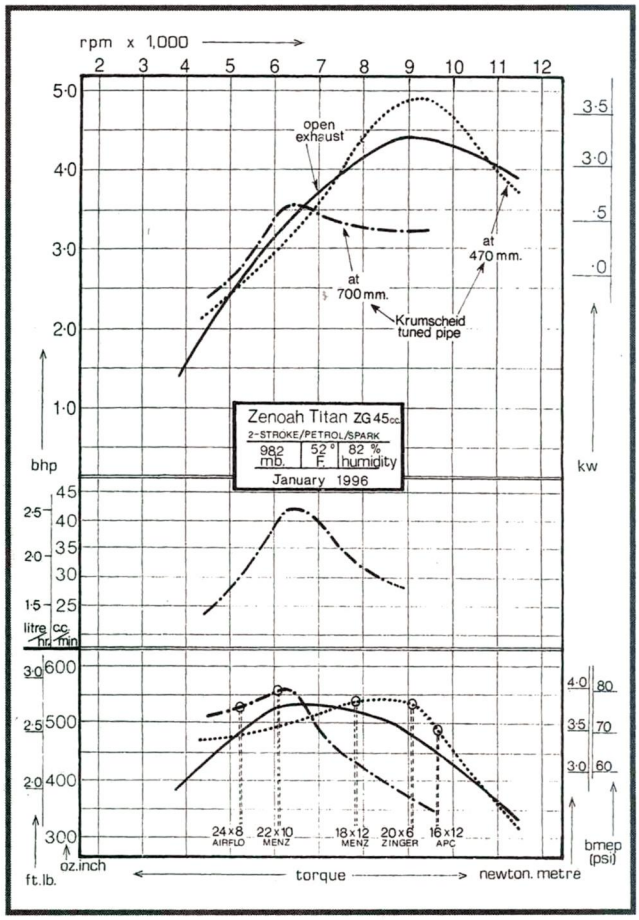
Maximum B.hp

Krumschied t/p @ 470mm	4.93 @ 9,310rpm
Open exhaust	4.46 @ 8,920rpm
Large-volume muffler	3.61 @ 8,440rpm
Standard industrial muffler	3.00 @ 8,400rpm

Maximum torque

Tuned pipe @ 700mm	560 oz.-in. @ 6,230rpm
Open exhaust	530 oz.-in. @ 6,660rpm
Large-volume muffler	460 oz.-in. @ 6,760rpm
Standard industrial muffler	410 oz.-in. @ 5,500rpm





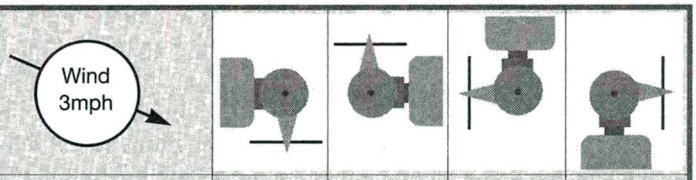
resonance point, I had to chop the manifold several times. Significantly higher hp—near to 5—became available. Placing the max. resonance near to the best open-exhaust hp point is usually very productive and makes much sense mechanically speaking; that's where the engine feels most liberated, and the tuned pipe just accentuates that favorable position on the rpm scale.

• **Propeller rpm in relation to pipe-resonance positions.** My reported rpm figures are "static" ground-based ones. This of course means that when the aircraft moves forward and the load on the prop lessens, an airborne rpm rise is usually inevitable. The old "10 percent rpm rise in the air" doesn't say enough. With any internal-combustion engine that has a "humped" hp curve compared to rpm, the actual rpm rise depends on just where on the hp curve the static ground rpm is pitched. When propped on the lower rpm and rising hp side of the curve (usually on the left-hand side of graph), this will lead to larger airborne rises than if propped at peak hp or above in rpm. Where the typical "high-sided" tuned-pipe curve is concerned, this simple mechanical fact is exaggerated.

For example, on the 700mm-pipe hp curve, the 24x8 Airflow prop has the best chance of a large airborne increase because this prop put rpm just near the start of the precipitous rise in hp that occurs, and any forward movement that lessens propeller load immediately increases hp, so rpm rise quite swiftly—almost uncontrollably, with some pipe designs—to max. resonance. The rate of increase is largely determined by the craft's acceleration. We may see a 1,000rpm airborne increase—a large percentage rise when starting from the very low 5,000rpm.

Conversely, when using the 16x12 APC prop with the 470mm pipe, the potential airborne rise is severely restricted; forward movement again sees some reduction of propeller load, but if rpm were to rise, we'd see such a large hp deficit that the craft would barely accelerate at all. This phenomenon—called "propeller-braking," for obvious reasons—is used as a positive feature in much pattern-aircraft activity. In general, engine operations "past the pipe peak" are quite stable and can lead to very steady speed envelopes, but you're not getting the best out of the prop/engine combination.

Zenoah G-45cc



9 feet AMA/USA	Standard muffler 24x6 Airflow 5,880rpm	104	101	94	100
	Standard muffler 20x6 Zinger 5,880rpm	107	102	102	104
7 meters at BMFA/U.K.	Standard muffler 24x6 Airflow 5,880rpm	93	86	84	90
	Standard muffler 20x6 Zinger 5,880rpm	97	88	93	96

dB meter

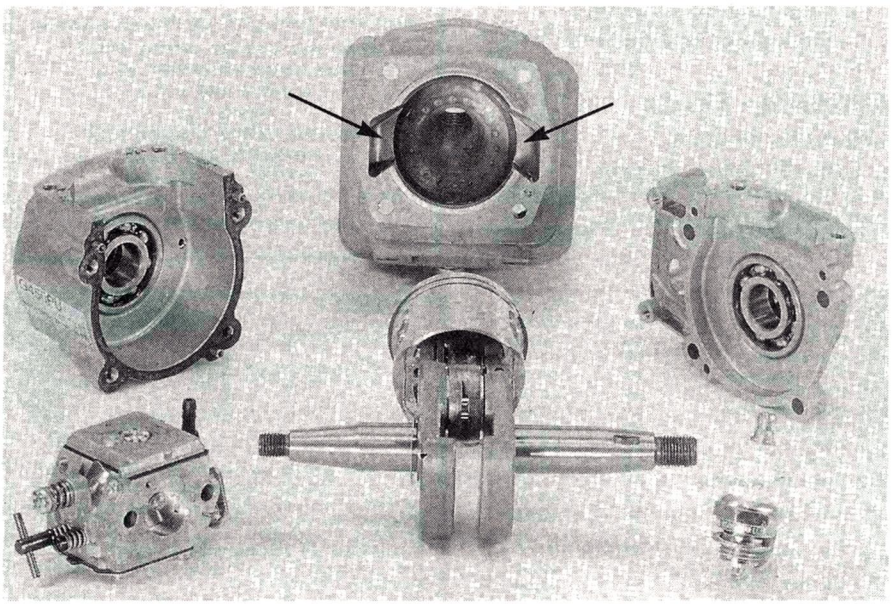
Engine: Zenoah G-45cc
Equipment: industrial muffler
Fuel: unleaded gas
Temperature: 29° F
Humidity: 73%
Pressure: 996mB
Meter: Radio Shack type 33-2050 using GA601 calibrator set to NPL standards.
Height: both meter and engine set 1 meter above concrete.
Location: outdoors, adjacent to farmland.

• **Idling.** Use of the heavy 22x10 Menz prop and industrial muffler allowed an easy 1,400rpm with quick, trouble-free acceleration to max. rpm. The main needle setting was ¾ to one turn open, and the idle needle was set at two turns open.

SUMMARY

The Zenoah G-45 engine bridges the gap between the utilitarian industrial engine and the more sophisticated model engine proper. In model terms, it's still big, but many of the usual conversion's "rough edges" have been smoothed away. Having used it with the superior automatic spark-ignition system and the almost foolproof carburetor, I find it that much harder to return to testing glow-ignition engines.

At the end of my tests, the engine's condition was virtually unchanged.



The transfer ports (arrowed) are tapered inward to the cylinder. They're useful features; they accelerate the speed of the gas mixture entering the cylinder. The halves of the robust two-piece crankcase are accurately spigotted together. On both crankshafts, rubber seals prevent the leakage of both oil and gas mix.

MODEL AIRPLANE NEWS

FIELD & BENCH REVIEW

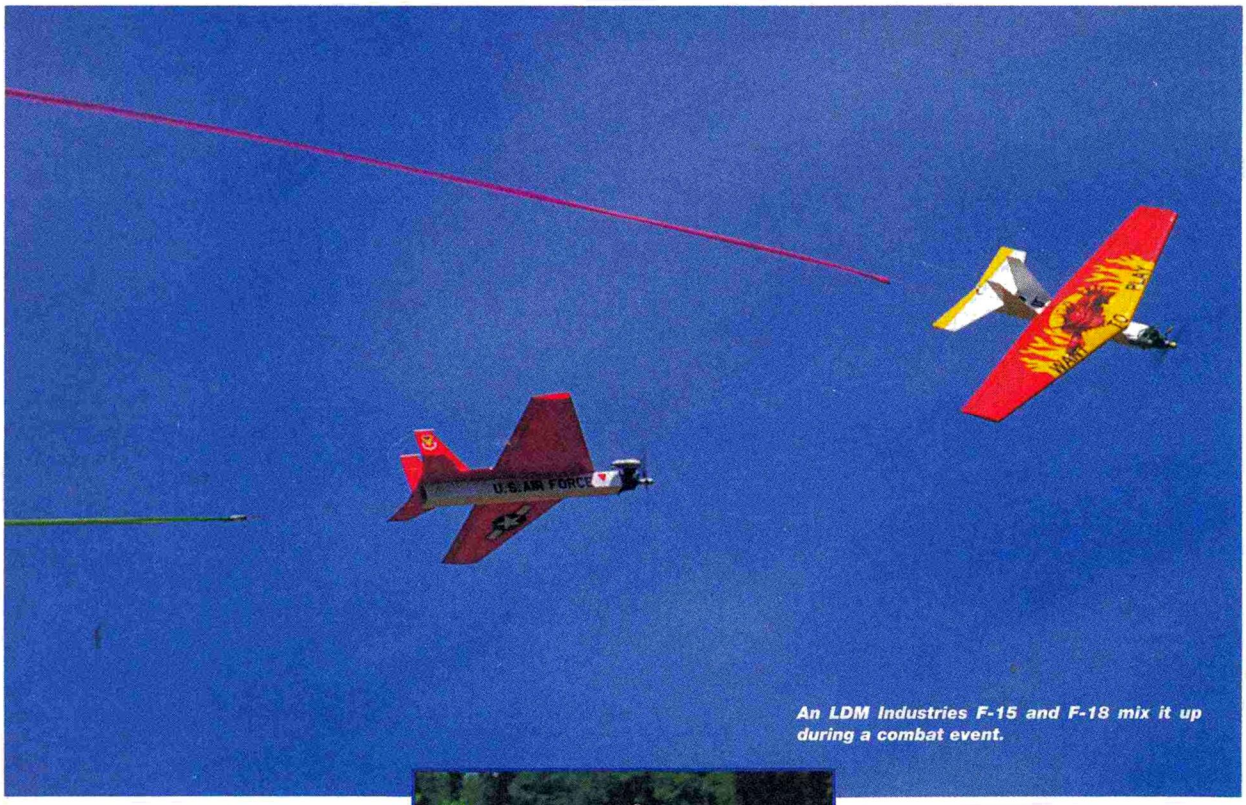
by MIKE DEHOYOS

A FEW MONTHS ago, our club held an R/C combat event, and we enjoyed it more than any other activity we've ever done collectively. Much of that fun came from our use of LDM Industries'* Combat Fighter Series planes—the F-15 Eagle, F-16 Falcon, F-18 Hornet and A-10 Warthog. They all have the same type of construction and, as a few midairs proved, they're extremely durable. Here's how each one is assembled.

LDM INDUSTRIES

Combat Fighter Series

Durable dogfighters



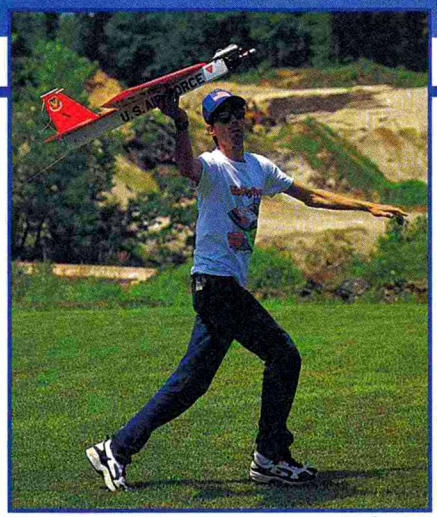
An LDM Industries F-15 and F-18 mix it up during a combat event.

CONSTRUCTION

• **Tail feathers.** The tail assembly is all precut 3/16-inch balsa pieces that you glue together according to the instructions. I marked and drilled the mounting holes at the proper locations and, to strengthen the wood around the tail-mounting holes, I made tiny pinholes around the screw holes and allowed thin CA to run into them. When the glue dries, it's surprisingly hard.

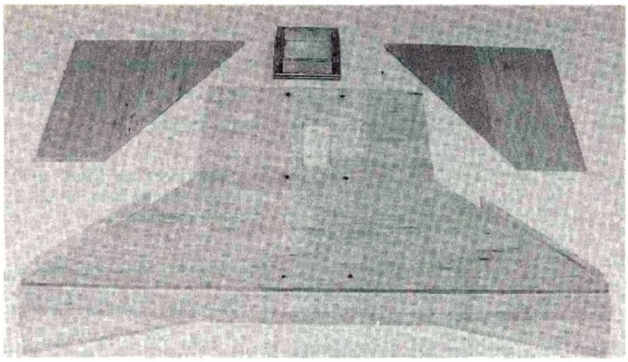
The elevator was hinged and the entire horizontal stab was flat-sanded. It's easier to cover the vertical fins before they're installed on the horizontal stab. Having glued them into place, cover the rest of the stab and set the tail feathers aside for installation later.

• **The wing.** I started by assembling the spar, which is composed of two tapered pieces of lite-ply and a pair of doublers that are epoxied onto either side. The foam wing has four sections that are epoxied to the spar. Make sure the slot in the spar is flush with the foam. Glue on the leading edges and trailing-edge-strip pieces, and shape them to the wing profile. Then epoxy the wing saddle into place. After that, I followed the instructions to install the torque rods, the inboard trailing-edge pieces and the ailerons. After a little final sanding, the wing was ready to cover.



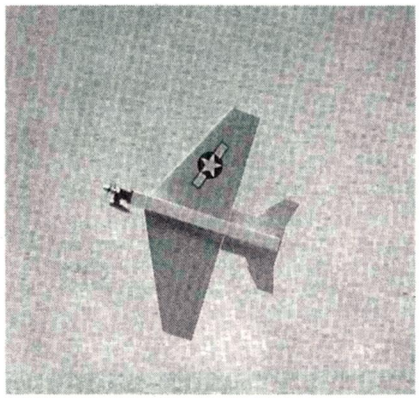
Hand-launching is the normal M.O. for LDM Combat Series models.

• **Fuselage.** The simple fuselage doesn't require much work. Cut out the two radio access holes and the hole for the aileron



The completed tail surfaces and the firewall of LDM Industries' F-15 Eagle combat plane. LDM's Combat Fighter Series planes are all constructed in basically the same way.

servo following the instructions. Glue the two ¼-inch-ply wing-bolt plates into place with 5-minute epoxy. Then position the wing on the fuselage. At the correct locations, drill three holes, each going through the wing, the fuse and the wing-bolt plates. After removing the wing, I ran a ¼x20 tap through the wing-bolt plates and hardened the threads with thin CA. Finally, using the kit-supplied screws, I joined the tail assembly to the fuselage.



The lower side of the F-15 just after a pull-out from a strafing run.

• **Radio installation.** The instructions are clear, so be sure to follow them. Servo placement has been thought out to ensure the correct balance, so stick to it. The servo rails are held in place by screws that enter the right and left sides of the fuselage; take care when you're measuring to determine the holes' positions. Three of the planes in the series have the aileron servo mounted in the top of the fuselage just behind the trailing edge. When you've mounted the servos, connect the pushrods and check the control-surface throws. Set the throws as recommended in the instructions. If you don't, you could have a wild ride on your first flight.

SPECIFICATIONS

Manufacturer: LDM Industries
Model: F-15 Eagle
Wingspan: 44 in.
Length: 38 in.
Wing area: 510 sq. in.
Wing loading: 19.2 oz./sq. ft.
Airfoil: symmetrical
Weight: 4 to 4.25 lb.
No. of channels req'd: 3 (throttle, aileron and elevator)
Radio used: Futaba* FP-7UAPS with 3 servos
Engine req'd: 40 to 46
Engine used: O.S. 40FP
Prop used: Master Airscrew* 10x6
List price: $39.95 (available direct only)
Features: ABS fuselage; precut balsa parts; plywood spar; foam wing.
Comments: easy and quick to build; fast flier: you should have the skills to handle it.

Hits
- Extremely durable.
- Fast, maneuverable flier.
- Can be assembled quickly.

Misses
- High-speed stall, if too much elevator throw is used (with aft CG location).

• **Engine and firewall.** Following the instructions, I assembled the firewall with 30-minute epoxy and set it aside to dry.

FLIGHT PERFORMANCE

Before attempting to fly one of these planes, make sure it's balanced and that the control throws are at the proper settings.

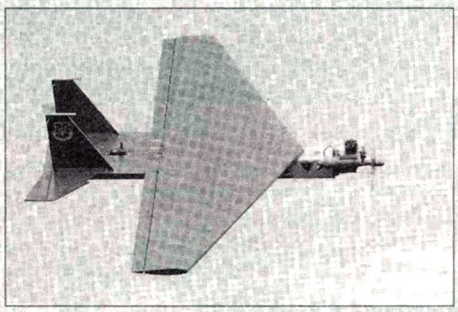
by ROGER POST JR.

• *Takeoff and landing*

For these planes, hand-launching is the M.O. Landing gear can be added, but they create too much drag. With the engine running at peak rpm, the planes will climb out quickly from a hand-launch. During the climb-out, keep the wings level with the ailerons, and if the speed is too fast for you, reduce the throttle to ⅔, and you'll still have enough power to climb.

To maintain straight and level flight, the planes generally need a little down-trim, and landing requires airspeed management. As you set up a pattern, gradually reduce the throttle and add up-trim to relieve the backpressure on the stick. On the final approach, with the throttle at idle and significant up-trim added, you can slow these planes down considerably for the belly landing they require. Use the elevator to control the airspeed.

You can also cut the engine and glide the planes in for a landing. They do glide well.



• *High-speed performance*

At full throttle, these planes are *fast*. The A-10 isn't as fast as its counterparts, but it can still move quickly. Power-on stalls can only be achieved by reducing the throttle to ⅔. The planes' stall break is fairly sharp, and recovery requires that the elevator control be neutralized and that the plane be allowed to fly out of the stall.

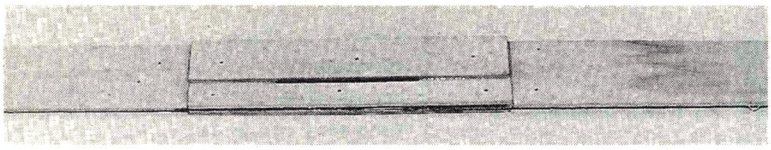
• *Low-speed performance*

With the power reduced and up-trim added, these planes will fly slowly; but if your thumbs are twitchy, you may tend to overcontrol the plane. A gentle touch is necessary here. A power-off stall has a very slight break and requires the addition of power and reduction of backpressure. This allows the plane to fly out of the stall.

• *Aerobatics*

With no rudder, aerobatics are limited. Loops are fairly big and round; a tight loop could result in a snap-roll. The planes roll quickly and axially in either direction. They fly very well inverted, and with a little down-trim added, they'll fly straight and level, hands-off. Spins require either right or left aileron input and full-up elevator to enter. To recover, neutralize the controls and pull out of the dive. Split-S's and Immelmanns are required maneuvers for combat, and these planes do both well.

You'll enjoy flying these models. Just be careful with the control-throw settings. If you're a novice, seek some help from an expert before you attempt to fly one.



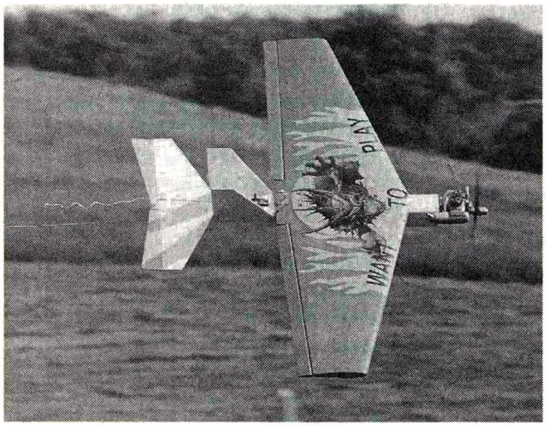
The completed wing spar; foam wing panels will be glued to it. When the wing is complete, it's very durable and will take a lot of punishment.

Then I mounted it on the fuse and drilled the holes for the firewall mounting screws, the engine mount, the throttle pushrod and the fuel line that goes to the carburetor.

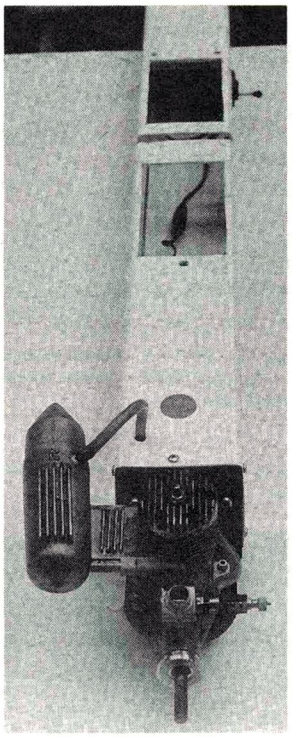
I mounted an 8-ounce fuel tank inside the nose, cut a hole in the fuselage for the vent line and ran the fuel tubing through it. Next, I mounted an O.S.* 40FP on the firewall and attached the firewall to the front of the fuselage. To finish, I connected the throttle pushrod and fuel tubing and finished the plane's nose.

That's all there is to it! After a day or two of bench work, you'll be out there dogfighting with the rest of the gang. Just remember to check the balance and the control throws before you go to the field, and if you are a novice, get some help! Enjoy.

**Addresses are listed alphabetically in the Index of Manufacturers on page 122.*



The F-18 Hornet on a low flyby.



An O.S. 40-FP mounted on the front end of the LDM F-15. All Fighter Series planes have the same engine-mounting system.

Editor's note: LDM Industries recommends the use of an engine/prop/engine-mount combination weighing approximately 20 ounces. Using a lighter combination will set the CG at the rearmost recommended position. Because it's short-coupled, when set up as shown on the plans, the aircraft is very maneuverable. Increasing the control throws above the suggested amounts will actually decrease maneuverability instead of enhancing it.

MODEL AIRPLANE NEWS

PRODUCT REVIEW

A replacement for the classic X-347

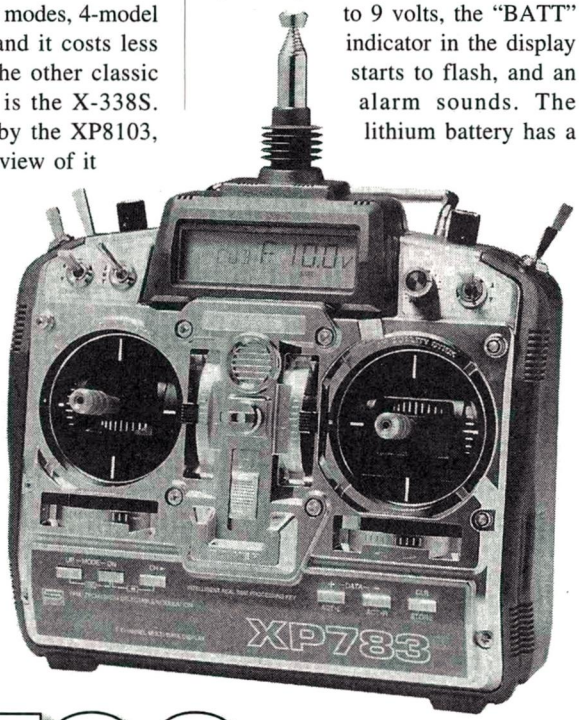
JR XP783

by ROGER POST JR.

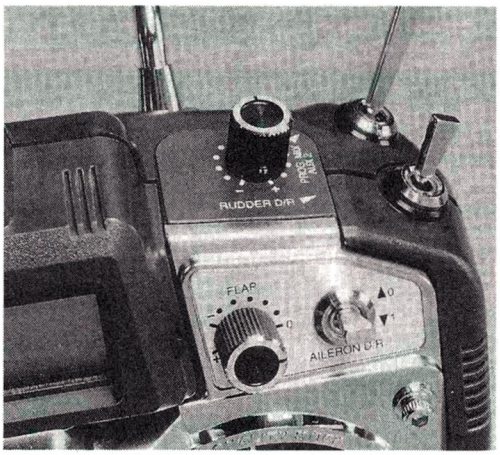
JR* HAS added two great new radios to its line and has discontinued a couple of classics. The new JR XP783 (7 channels, 8-model memory, three aircraft modes) was designed to replace JR's previous 7-channel radio, the X-347 (three aircraft modes, 4-model memory, 7 channels), and it costs less than its predecessor. The other classic that was discontinued is the X-338S. This is to be replaced by the XP8103, and we'll have a full review of it in a future issue.

TRANSMITTER

The transmitter for the XP783 system is exactly like JR's 8-channel X-388S (three aircraft modes, 8-model memory, 8 channels), transmitter, but internally, one of the channels has been deleted, and externally, the label faceplate has changed. The knob that would have been used for the eighth channel is still there and can function as a mixing or trim knob. The transmitter is powered by a Sanyo 9.6V battery pack and has a lithium memory backup battery. If the Sanyo battery drops to 9 volts, the "BATT" indicator in the display starts to flash, and an alarm sounds. The lithium battery has a life of about five years. If this battery fails, the display reads "BKUP ERR," regardless of the on/off switch position. If this occurs, the transmitter will have to be reprogrammed.



The XP783 transmitter. It has four more model memories than its predecessor.



A view of the transmitter's top right-hand quadrant. The knob on top doesn't have a channel assigned to it, but it can be assigned mixing or trim functions.

The XP783 has two types of trainer functions. The first type allows all functions to be transferred to the trainer transmitter. The second type lets the instructor program what he wants the student pilot to have on his transmitter. For example, if the student has a problem using all four channels at the same time, the instructor can send one channel at a time to the student transmitter. This would allow the student to advance in steps rather than be overwhelmed by every function at once. The XP783 has the handy Direct Servo Control (DSC) system that allows you to check servo movements without turning on the transmitter.

To access the model setup mode, depress both the up and down keys and then turn on the transmitter. You can now select the model number, name it, choose the type of aircraft, reset data, change the wing mixing (delta, flaperon, or normal) and modulation type, etc. If you press the up and down keys twice more, you can access the function mode. There are 21 functions, including dual rate, exponential, servo-reversing, sub-trim adjustment,

SPECIFICATIONS

Model: JR XP783

Type: 7-channel computer radio available on 50, 53, 72MHz

Manufacturer: JR

Distributor: Horizon Hobby Distributors

Transmitter: 7 channels; 8-model memory; 3 modes: airplane, helicopter, glider.

Receiver: NER-549X (FM), NER-649S (PCM)

Servos: four 507 servos (FM), four 517 servos (PCM)

Accessories: switch harness; DSC connector; Sanyo 600mAh battery pack; accessory pack; channel numbers; aileron extension; 110V AC wall charger; manual; neck strap.

Weight of airborne unit: 10.7 oz.

Part no: FM—JRP7210, PCM—JRP7242 (the channel number the customer would order)

Street price: FM—$399.95, PCM—$499.95 (airplane versions)

Features: a microcomputer system; computer-designed case; improved control sticks; 8-model memory; five-year lithium battery backup; automatic fail-safe "set"; programmable trainer function; Direct Servo Control (DSC); transmitter has an audible alarm for low battery level.

Comments: the XP783 is the same as the 388S but with one less channel. All the great qualities of the 388S have been retained, so if you feel that you have missed out on the 388S, pick up a 783 and use it in your favorite plane, glider or heli.

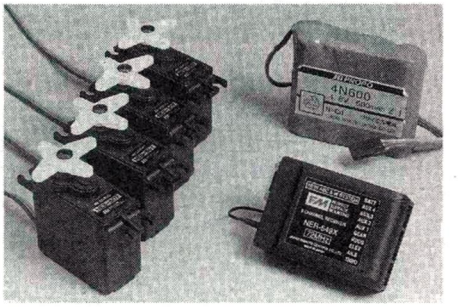
Hits
- Easy to program.
- All the great features of the 388S.
- Costs less than the discontinued 347.

Misses
- Receiver lead on charging unit could be longer.

I would recommend this one to start with because even if you lose the manual, you'll still be able to figure out how to program it. Just keep pushing the keys until what you want appears on the display screen.

travel adjustment, five mixing functions, etc.

With the antenna fully extended, the ergonomically designed case feels well-balanced when you hold it. All switches and knobs are easily accessed by your fingers, and with a little practice, you'll be able to feel for what you want without taking your eyes off your plane. You'll find programming this transmitter extremely easy, but note one thing: the clear/store key on the transmitter's lower right side will clear the percentages gained back to the factory setting, but the store key doesn't store the information. To store, turn the radio off, re-access the model setup mode and change the model selection number.



The FM airplane version comes with four 507 servos, an NER-549X receiver and a 4.8V, 600mAh battery pack. All components work extremely well, but cycle the battery before you use it.

AIRBORNE UNIT

The XP783 airborne unit consists of an NER-549X (FM) or NER-649S (PCM) 9-channel receiver, four 507 non-ball-bearing servos (FM) or four 517 ball-bearing servos (PCM), a 4-cell, 4.8V, 600mAh battery pack, a switch harness and an aileron extension. The servos are standard size, and the total airborne weight is 10.7 ounces. The receiver features the ABC&W system (anti-blocking, cross-modulation and windows circuit) that filters out incoming signals through a series of progressively smaller electronic "windows" until only the transmitter signal remains. The review radio was an FM, so it came with four 507 servos that provide 40.3 oz.-in. of torque. These servos work very well in the .40-size trainers and sport planes and have been used with great success in Revolution's new HoverStar helicopter.

MANUAL

For those of you who haven't been exposed to computer radios, the manual for the XP783 has step-by-step instructions for acro/glider/heli (three separate sections) that make programming extremely easy. The only thing you have to remember is what the abbreviations stand for.

The manual starts with programming charts, then moves on to features and specifications, battery charging and three sections of software functions: airplane, glider and heli. Each section has eight subsets that detail the transmitter, connections, key input and display, alarm and error display, input mode and functions, mode and functions, mixing applications and data sheets. The manual is very thorough and very user-friendly.

CONCLUSION

When I first heard that the X-388S had been discontinued, I couldn't believe it. I have used one for the last three years and found it extremely reliable and a snap to program. Why mess with success? But after using the XP783 (my Dad and I used it with great success on his Piper Cub), I see that the folks at JR know what they are doing when it comes to marketing. If you drop a channel that was hardly used on your popular 8-channel radio, replace your previous 7-channel radio with this new one, keep the same reliability and feel, and offer it at a lower price, you're bound to have a winner. And that's what you'll have if you get an XP783. It's extremely easy to program, and it will provide more uses and functions than you can utilize. If you've never owned a computer radio, I would recommend this one to start with because even if you lose the manual, you'll still be able to figure out how to program it. Just keep pushing the keys until what you want appears on the display screen.

The transmitter's upper left-hand quadrant. Everything on this side has an assigned function or two.

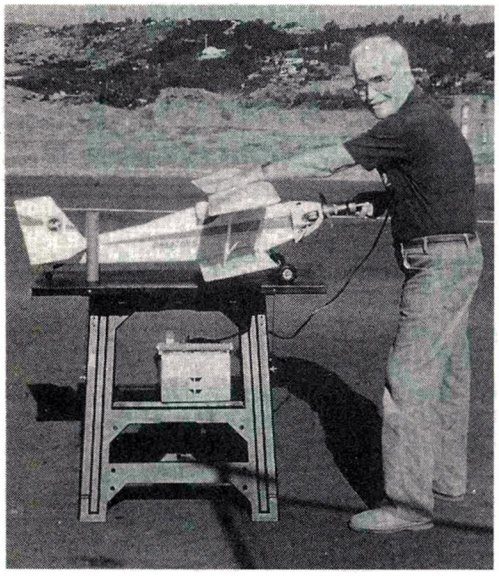
**Addresses are listed alphabetically in the Index of Manufacturers on page 122.*

MODEL AIRPLANE NEWS
HOW TO

Build an Inexpensive Field Stand

by JOHN GORHAM

I HAVE been modeling for more than 60 years—and flying R/C powered planes and helicopters for more than 25 years—and have loved every minute of it. But as I've gotten older, it has become not only very uncomfortable to kneel, squat and bend over to work on my planes at the field, but also difficult and sometimes painful to stand up again.



Now, at 73, I finally decided that it was time to introduce a little more comfort to the hobby. First, I listed requirements for a stand that would make it easier to start, park and service R/C models.

The primary requirements were that my flight table take up minimal space when disassembled and not restrict the number of planes I can carry in my vehicle. I also wanted it to be quick and easy to set up at the field. And so, the concept of my portable tabletop field stand was born.

The major design requirements were that the stand:

- Fit vertically behind a car's front seats and not reduce the amount of precious space available for the models.
- Not be thicker than about 4 inches when folded or longer than 46 inches to accomplish the above.
- Be easily and quickly assembled and disassembled at the field.
- Have a strong and safe built-in restraint to hold the model while the engine is started and adjusted.
- Be high enough to allow the pilot to stand upright while starting the engine, adjusting it, or doing repairs.
- Provide readily accessible storage space for fuel and starting equipment and a flat surface for repairing or adjusting the model.
- Have a fuelproof top that can easily be cleaned at the field.

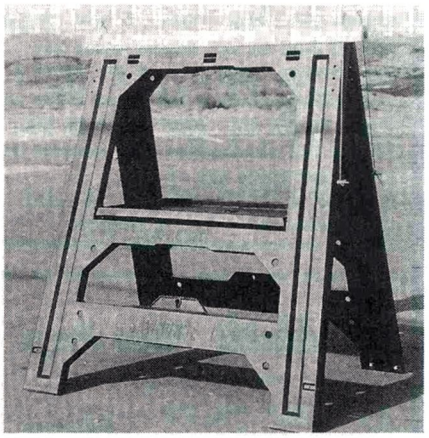
MATERIALS

My search for materials took me to Home Depot. On the way out, I saw a stack of molded, folding, single, sawhorse elements by ZAG for about $20 each. They were perfect. They're sturdy and light and provide an integral tray for the field equipment. They are about 2 inches thick when folded. The only problem was that, because it's a single saw-horse unit, the top surface is only about 2 inches wide—hardly enough for an R/C model!

Strong, safe and easy to assemble

All I needed was a tabletop and the means to mount it rigidly on the stand. I decided on a laminated framework design. I bought two 10-foot lengths of 2x1-inch pine for $1.50 each and two 2x4-foot sheets of ⅛-inch-thick hardboard for $2.50 each. For the restraints, I purchased two metal flanges (used to anchor 1-inch metal pipe to a wooden surface) and two 12-inch lengths of 1-inch-diameter plastic pipe threaded at both ends. These pipes were then covered with 1-inch-i.d. foam-rubber insulation tubing (see Figure 1).

I selected 40x18 inches as the size of the top; this was large enough for my current models, and it fit into our family wagon behind the front seats. The top can be larger or smaller to suit your needs. The final problem was how to fit the top on the stand so that it would be strong enough for field operations but readily disassembled.



The ZAG sawhorse that forms the base of the field stand. These sawhorses are light, fold easily and cost only $20 at Home Depot.

ASSEMBLY

First, the top must be held so that it doesn't slide sideways or fore and aft. The sawhorse stand already had ¼-inch holes in several places on the top, so this problem was easily solved by fitting two headless screws into the underside. These screws lined up with two holes in the stand. Four 14-gauge steel wire braces between the top and the stand prevented the top from teetering and rising off the stand. These can be rapidly fitted and removed. They are anchored by four screws and wing nuts mounted in the stand's legs.

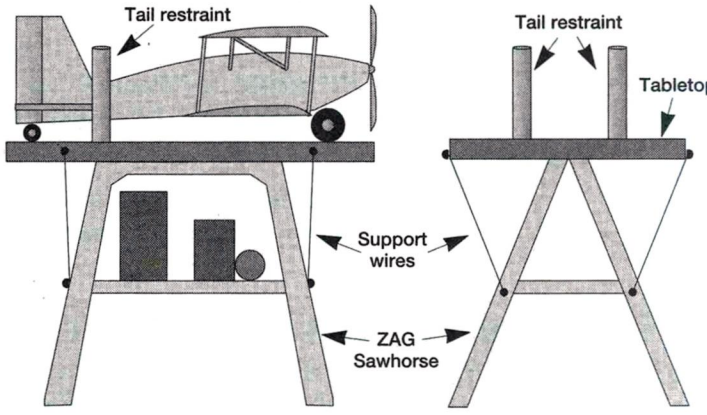


Figure 1. A side and rear view of the field stand.

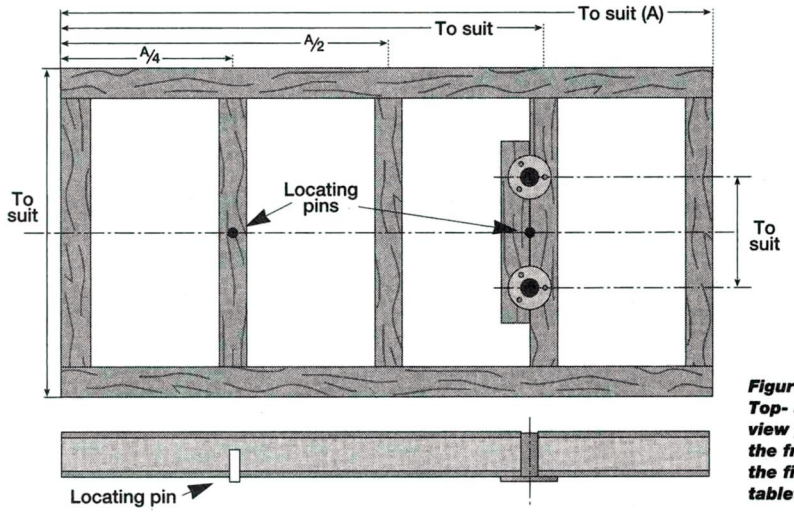
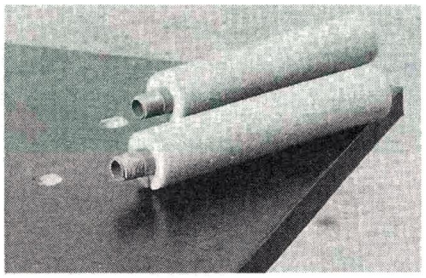


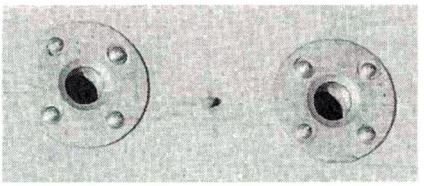
Figure 2. Top- and side-view plan of the frame for the field-stand tabletop.

Figure 2 shows how to make the top. The 1x3-inch (actually $^3/_4$x2$^1/_2$-inch) pieces of wood are cut as shown and glued to one piece of hardboard. Glue this unit to the other hardboard piece in the same manner. Before you glue on the final piece of hardboard, mark in pencil the spots on



The two 1-inch-diameter, 12-inch-high threaded plastic pipe restraints rest on top of the field stand. They are screwed into the recessed flanges in the bottom of the tabletop.

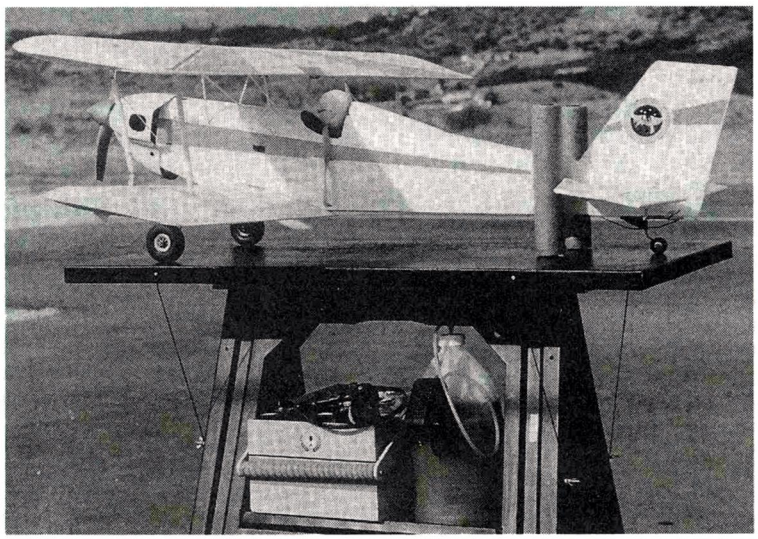
the top at which the wood framework will be glued. Bore the holes for the pipe flanges in the positions shown. Counterbore a hole for the flange of the flange mount first to a depth of about $^3/_8$ inch, then continue the hole at a 1-inch diameter all the way through. If you bore the smaller hole first, you'll have a problem. The flange was mounted, inverted,



The recessed flanges are installed inverted with $^3/_4$-inch wood screws.

from the bottom, with three $^3/_4$-inch wood screws. To fuelproof the top, I covered it with black Naugahyde (I tested the material at the store before I bought it by wiping some fuel on it). A finish of your choice can be used, but the black Naugahyde looks very classy.

Voilà!—a very functional flight stand and table for field operations for less than $30 (with a little construction work). Keep flying!



The completed assembly with all the components in place. The lower tray holds the toolbox, battery, starter and fuel can. The thin wires support the top when it's placed on the stand.

MODEL AIRPLANE NEWS

PRODUCT REVIEW

SKY INC.

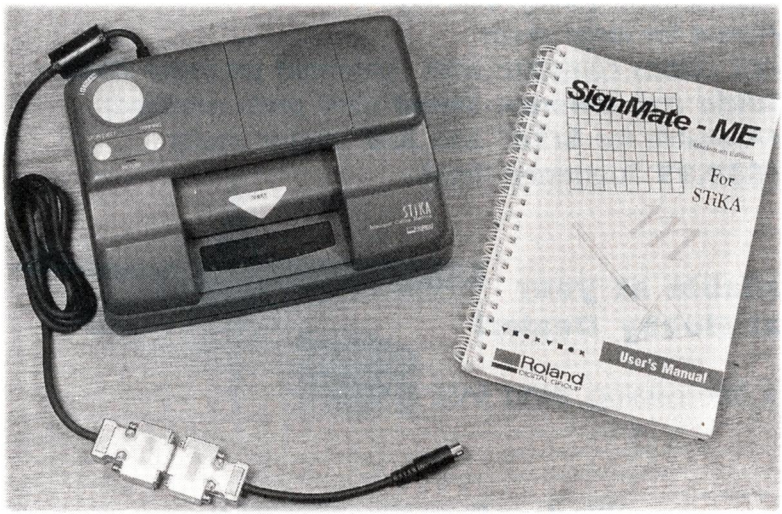
STiKA

A professional vinyl-cutting machine for your workshop

by MIKE MAYES

YOU JUST finished a project that you've been working on all winter. You look at your model and realize that something isn't quite right because the picture on the box looks a lot better than what you've created. What's wrong? The answer may be that you need to add some graphics to your model. Fortunately, making your own graphics has become a lot easier.

Sky Inc.* has introduced a small, inexpensive, lightweight vinyl cutter called the Stika. This compact hybrid plotter is designed to cut vinyl, and it works with or without a computer. It has better typesetting abilities than many commercial sign printers. I've used it in many applications, including to cut graphics and letters out of trim sheets and stencil material.



The Stika vinyl cutter is compact and easy to use.

Many images, such as this Fleet logo on the tail, can be duplicated in vinyl with the Stika. Images from magazines, books, letterhead and photographs can easily be scanned and reproduced.

The unit arrives almost ready to run. Before unpacking it, take the time to read the instructions. They are brief, easy to read and will answer many questions that you will have. Setting up the Stika is as simple as installing the cutter blade and plugging in the AC adapter.

MANUAL MODE

The scanner that's built in to the bottom of the Stika makes it quick and easy to create vinyl words and/or graphics for your model. To reproduce an image in vinyl, just scan the image, and insert the vinyl into the Stika so it can be cut.

In the manual mode, the Stika has two features:

• **Mirror-image scanning.** By scanning in the opposite direction, a mirror-image that results in a reverse cutout is created. This is useful if you're cutting letters and/or graphics that go on the inside of glass or under a clear or translucent covering.

• **Multi-copy mode.** To make a number of identical cutouts, simply keep feeding new sheets of vinyl into the unit. As long as the image indicator remains lit, any number of sheets can be cut.

SPECIFICATIONS

Product: Stika Vinyl Cutter

Manufacturer: Roland Digital Group

Distributor: Sky Inc.

Acceptable vinyl size: 3⅜ in.wide

Scanning resolution: normal—200 dpi, zoom—400 dpi

Magnification: 1x, 2x and 3x in normal scan and 2x 4x and 6x in zoom mode and proportional scaling in full mode. The image is scaled to fit the material in the machine.

Maximum cutting speed: 0.7 in./sec.

Size: 8x3x5 in.

Weight: main unit—2.6 lb., AC adapter—1.1 lb.

List price: $299

Features: the Stika Vinyl Cutter comes with the cutter unit, adapter cables (for PC or Mac), a SignMate program, an illustrated instruction booklet, a clear-plastic window sheet for scanning, transfer tape and assorted vinyl samples.

Comments: the unit is very easy to set up and use. You can make any design you want, or you can scan an image and duplicate it with ease. Vinyl material in the proper width is available in many colors from Sky Inc. The Stika is well worth the price.

Hits

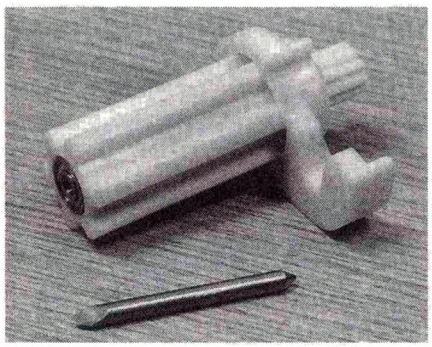
- Small, compact size.
- Personal computer interface (PC or Mac).
- Built-in scanner.
- Graphics software included.
- Well-illustrated instruction booklet.

Misses

- Maximum letter height is only 2½ in.

COMPUTER MODE

The Stika comes with its own custom control program called SignMate. The version I use was designed for Windows applications; a Macintosh version is also available for Apple users.



The blade is inserted into the plastic holder, which is very easy to install.

Here are the things you'll need to run "SignMate - WIN Software":

- at least a 386-based PC with a math coprocessor (a 486 is recommended);
- minimum of 8 MB RAM;
- hard disk with at least 5 MB, plus one 3-inch floppy drive;
- DOS 5.0 (or better) recommended;
- Windows Version 3.1, or a later version;
- Adobe Type Manager 2.02, or a later version (optional);
- 13-inch color VGA monitor (or better) is recommended;
- mouse;
- Stika cutter and cable using serial communications.

COMPUTER INTERFACE

The Stika is designed to interface with a computer using serial data communications. The data link is accomplished using a special serial data cable that is provided with the unit. One end of the data cable plugs into the data port on the Stika, and the other end is attached to any unused serial ports on your computer. The cable that comes with the Stika is designed to interface with a 25-pin COM port. If you are connecting the Stika to a 9-pin COM port, you will need a 9-to-25 adapter.

SIGNMATE INSTALLATION

SignMate is Windows-based and has a drawing program and a driver that's designed to control the Stika. I installed SignMate in Windows 3.1, and it worked fine. I haven't tried it with Windows 95 yet. Installation is simple: after starting Windows, insert the SignMate installation disk in your A: drive, and choose Run from the Program Manager's File menu. Type A:INSTALL and press Enter. Installation is almost automatic, and most configuration choices are defaulted to the recommended settings. After running the installation program, select the serial port to which you're connected by selecting Cut/Plot from the File menu and clicking on the Communications button. This will select the Communi-cations Settings pull-down window with COM port choices. Select the correct COM port and click OK. The installation process is that simple.

CREATING TEXT

The computer-generated text mode is the feature I use most often. This is how I create names and numbers for my R/C airplanes, boats and cars. A typical application is the creation of AMA numbers. You can make the numbers in your choice of fonts, sizes and vinyl color. Just click in the text area to stretch or compress the text.

Once it looks good, you can save the file for future use. The default typeface size is in inches; if you want a finer resolution, pull down the Size menu and select Units. From the Units menu, select Points, and enter the number of points you desire. When you find the typeface and size that best fit your application, save them by pressing the Add button in the Font Sizes menu.

DESIGNING A TEMPLATE

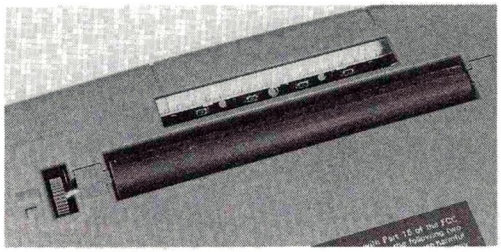
Graphics files in a TIFF format can be used to create a SignMate template. A few words of caution: the TIFF file shouldn't be too complicated, or it will cause problems when you cut the vinyl. The vinyl that comes with the unit is resilient, but if the template is too intricate, the vinyl will wrinkle or stick to itself when it's cut. To reduce the amount of clutter in a template, SignMate will automatically trace any TIFF file. Auto-Tracing creates an outline of the image, and that makes it easier for the Stika to cut it out.

For a scanned image, click on the Auto-Tracing tool, and Stika will outline it. Remove the image color, and you have a clean line drawing. You can select and delete unwanted markings. By zooming in on the image, you can also straighten lines or smooth curves by grabbing and moving the line-curve points. The final image will be much smoother and cleaner.

CUTTING GRAPHICS

Before you cut your graphics, be sure that the vinyl that you've loaded into the unit is the correct size and color. To cut, go to the File menu and select Cut/Plot; then click on OK. You'll see the vinyl moving in and out while it's being cut. When it's finished it won't look much different, but if you look closely you'll see where the outline has been cut.

The next step is to transfer the letters to your project. First remove any unwanted vinyl, then lay the clear transfer tape over the vinyl, and lift the image off the backing paper. When the letters are ready to be applied, simply align the transfer tape, press the letters into position, and burnish them down. The transfer tape can then be easily peeled away.



A built-in scanner head under the Stika allows you to use the unit without a computer.

Until now, if you wanted custom graphics you had to go to a professional sign shop; now you can make them at home. Considering its capabilities, the Stika is a bargain. Your models will look better, and the cost of creating new graphics will be much lower. If you want to make your own graphics, try a Stika; it's in my shop to stay.

Where to Find Graphic Material for the STiKA

Carl Goldberg Models Inc.*—Ultra Trim (precut for the Stika in 5-foot rolls); Ultracoat Plus (must be cut to size).

Vinnie Pinstriping Inc.*— Stika Vinyl precut in 18-inch sheets.

Coverite*—8x20-inch graphics trim sheet (must be cut to size).

Sky Inc.—Transfer Tape (3 inches by 150 yards); Thermal Flock iron-on T-shirt lettering material.

Other vinyl materials include Rubbermaid contact paper (for paint masks), which is available at hardware stores.

**Addresses are listed alphabetically in the Index of Manufacturers on page 122.*

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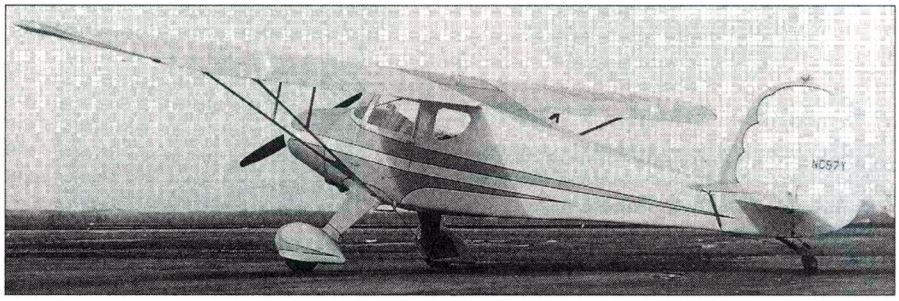
Name THAT PLANE

CAN YOU IDENTIFY THIS AIRCRAFT?

If you can, send your answer to *Model Airplane News*, **Name That Plane Contest** (state issue in which plane appeared), 251 Danbury Rd., Wilton, CT 06897-3035.



Congratulations to Graham Thompson of Pacific Palisades, CA, for correctly identifying the mystery plane shown in the July '96 issue. This single-seat ultralight was the second version of the "Brawny" and was manufactured by the Broughton-Blayney Aircraft Co. The Brawny was designed and built in 1936, and this particular plane was registered in December 1936. Its final flight, on June 6, 1937, ended with a crash in Browley Hill Cemetery, Kent, England. The single-seat, all-wood aircraft was powered by a 30hp Carden-Ford engine and had a top speed of 76mph. The original version was called the "Grasshopper," and it was manufactured by the E.G. Perman & Co. The company stopped manufacturing the plane after a short-lived attempt to produce a special version for the "Poux-du-Ciel." This earlier version had a 25-foot 6-inch wingspan, a cruising speed of 68mph and a landing speed of 35mph. Its empty weight was 425 pounds, and fully loaded it weighed 600 pounds. It had a range of 200 miles. Thanks to all who wrote in; good luck next month!

The winner will be drawn four weeks following publication from correct answers received (on a postcard delivered by U.S. Mail), and will receive a free one-year subscription to *Model Airplane News*. If already a subscriber, the winner will receive a free one-year extension of his subscription.

INDEX OF MANUFACTURERS

AristoCraft; distributed by Polk's Modelcraft Hobbies, 346 Bergen Ave., Jersey City, NJ 07304; (201) 332-8100; fax (201) 332-0521.

AstroFlight Inc., 13311 Beach Ave., Marina Del Rey, CA 90292; (310) 821-6242; fax (310) 822-6637.

B&B Specialties, 14234 Cleveland Rd., Granger, IN 46530.

Badger Air-Brush Co., 9128 W. Belmont Ave., Franklin Park, IL 60131.

Balsa USA, P.O. Box 164, Marinette, WI 54143; (800) 225-7287; fax (906) 863-5878.

Birdworks, P.O. Box 1302, Port Orford, OR 97465.

Bob Holman Plans, P.O. Box 741, San Bernadino, CA 92402; (909) 885-3959; fax (909) 889-9307.

Bob Violett Models (BVM), 170 State Rd. 419, Winter Springs, FL 32708; (407) 327-6333.

Brison Aircraft, 12075 Denton Dr., Ste. 11, Dallas, TX 75234; (214) 241-9152; fax (214) 241-5065.

Carl Goldberg Models, 4734 W. Chicago Ave., Chicago, IL 60651; (312) 626-9550.

Coverite, 420 Babylon Rd., Horsham, PA 19044; (215) 672-6720; fax (215) 672-9801.

D&W Aircraft, 499 Mid Pines Way, Modesto, CA 95354.

DAD (Design & Development Corp.), 1412 317th Ave. NE, Cambridge, MN 55008; (800) 669-4548.

Dave's Aircraft Works, 123 Avenida Buena Ventura, San Clemente, CA 92672.

Dave Brown Products, 4560 Layhigh Rd., Hamilton, OH 45013; (513) 738-1576; fax (513) 738-0152.

Dave Platt Models, 1306 Havre NW, Palm Bay, FL 32907; (407) 724-2144.

DJ Aerotech, 719 Fisk St., Piqua, OH 45356; (513) 773-6772; email: DJWerks@aol.com.

Dynamax; distributed by Jet Model Products (see address below).

F&M Enterprises, 22522 Auburn Dr., El Toro, CA 92630; (714) 583-1455; fax (714) 583-1455.

Flightec, 21 Juniper Way, Hamilton, NJ 08619; (609) 586-3317.

Futaba Corp. of America, P.O. Box 19767, Irvine, CA 92713-9767; (714) 455-9888.

Global Hobby Distributors, 18480 Bandilier Cir., Fountain Valley, CA 92728-8610; (714) 963-0133; fax (714) 962-6452.

Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-1104.

Harry Higley & Sons, Inc., P.O. Box 532, Glenwood, IL 60425; (708) 755-8774.

HobbyPoxy, 36 Pine St., Rockaway, NJ 07866; (201) 625-3100; fax (201) 625-8303.

IMP (Innovative Model Products), P.O. Box 333, Remsen, NY 13438.

ISC Intl., P.O. Box 40116, Indianapolis, IN 46240; (317) 846-0766.

JD Models Products, P.O. Box 386, Pacifica, CA 94044; (415) 359-0406.

Jet Model Products (JMP), 211 N. Mullen Rd., Belton, MO 64012; (816) 331-0356.

JR Remote Control; distributed by Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511.

K&B Mfg., 2100 College Dr., Lake Havasu City, AZ 86403; (520) 855-7901; (520) 855-5930.

Kennedy Composites, 10215 N. MacArthur, #136, Irving TX 75063; (214) 831-1141.

Lanier RC, P.O. Box 458, Oakwood, GA 30566; (707) 532-6401; fax (707) 532-2163.

Levoe Design, 510 Fairview Ave., Sierra Madre, CA 91024; (818) 355-2992.

LDM Industries Inc., P.O. Box 292396, Tampa, FL 33687-2396; (813) 991-4277; fax (813) 991-4810.

Magnum; distributed by Global Hobbies (see address above).

Master Airscrew; distributed by Windsor Propellor Co., 3219 Monier Cir., Rancho Cordova, CA 95742; (916) 631-8385; fax (916) 631-8386.

Model Graphics, 121 Cove Rd., Hemphill, TX 75948.

Moki; distributed by Gerard Enterprises Inc., W226 N825 Eastmound Dr., Waukesha, WI 53186; (414) 521-0547; fax (414) 521-0551.

Multiplex Modelltechnik GmbH, Neuer Weg 15, D-75223 Niefern, Germany.

O.S.; distributed by Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-1104.

Pica-Robbe Inc., 2655 N.E. 188th St., Miami, FL 33180.

Precision Aviation Design, 1822 6th Ave W., Bradenton, FL 34205.

Robart Mfg., P.O. Box 1247, 625 N. 12th St., St. Charles, IL 60174; (708) 584-7616; fax (708) 584-3712.

Rossi; distributed by Sig Mfg. Co. (see address below).

Sailplanes Unlimited Ltd., 63 E. 82nd St., New York, NY 10028; (212) 879-1634.

Sig Mfg. Co. Inc., 401 S. Front St., Montezuma, IA 50171; (800) 247-5008 (order only); fax (515) 623-3922.

Sky Inc., 1320 Gay Lussac St., Ste. 106, Boucherville, Quebec, Canada J4B 7G4; (514) 449-0142.

Slimline Mfg., P.O. Box 3295, Scottsdale, AZ 85271; (602) 967-5053; fax (602) 967-5030.

Sonic Tronics, 7865 Mill Rd., Elkins Park, PA 19027; (215) 635-6520; fax (215) 635-4951.

Spring Air Products, P.O. Box 37-3218, Satellite Beach, FL 32937; (407) 728-9002; fax (407) 728-2881.

Sullivan Products, P.O. Box 5166, Baltimore, MD 21224; (410) 732-3500; fax (410) 327-7443.

The Aeroplane Works, 2134 Gilbride Rd., Martinsville, NJ 08836; (908) 356-8557.

Top Flite; distributed by Great Planes Model Distributors (see address above).

Tru-Turn, P.O. Box 836, South Houston, TX 77587; (713) 943-1867.

Viojett; distributed by Bob Violett Models (see address above).

Vinnie Pinstriping Inc., 20 Soulice Place, New Rochelle, NY 10804; (914) 633-7062.

Zap Glue, 9420 Santa Anita Ave., Rancho Cucamonga, CA 91730.

Zinger; distributed by J&Z Products, 25029 S. Vermont Ave., Harbor City, CA 90710.

LATEST PRODUCT RELEASES

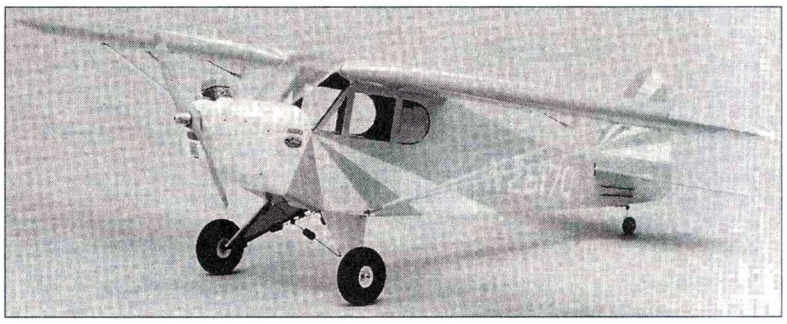
BOB DIVELY MODELS

Affordable Dummies

Quarter-scale and 1/3-scale ABS plastic dummy engines are now available. The 7-cylinder 1/4-scale engine is 10.5 inches in diameter and the 9-cylinder 1/3-scale engine is 12 inches in diameter. Molded in durable, easy-to-work-with 0.040-inch material, both engines come with detailed rear sides for realism in exposed-engine situations.

Part nos.—DE-502 (1/4 scale), DE-503 (1/3 scale); **prices**—$14.95, $18.95.

Bob Dively Models, 38131 Airport Pky. #206, Willoughby, OH 44094; (216) 953-9254; fax (216) 953-9311.



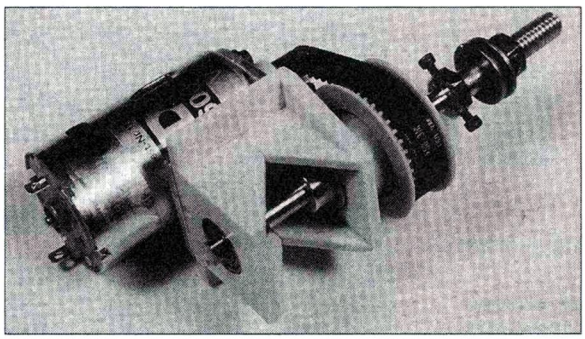
GREAT PLANES MODELS DISTRIBUTORS

Kyosho Clipped-Wing Cub

Kyosho's superbly crafted clipped-wing ARF J-3 Cub is now available in a 63-inch wingspan version finished in a pink starburst scheme. Like the original blue-and-white Cub, the kit is high-quality balsa and wood construction and can be ready for the flightline in just 10 to 12 hours. Features include: barn-door ailerons; pre-soldered scale landing gear; assembled wing struts; "kit-like" construction; shaped, pop-in windows; and two-piece wing for easy transportation. For .40 to .46 2-stroke or .48 to .70 4-stroke engines.

Part nos.—KYOA1003 (pink); KYOA1002 (blue-and-white); **prices**—$349.99, $349.99.

Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-0008.



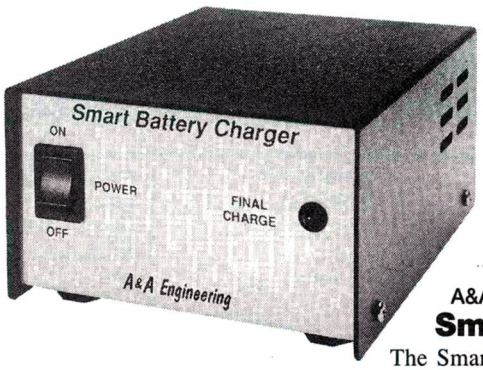
MODELAIR-TECH

H-500 Belt Drive

The H-500 was designed primarily for 1.4-inch-diameter (35.5mm) motors with 1-inch (25mm) bolt spacings, such as the Graupner Speed 500/600 series, AstroFlight 035-15, Aveox 14xx, SR Max 7 and 10 and many other European motors of this diameter. It's best suited to 400- to 700-square-inch sport and scale models with small, light motors that are capable of running on 12 to 18 cells, where gearing with a high-ratio reduction drive is specified. Currently available in 3.27:1 and 3.6:1 ratios. Other ratios can be special-ordered.

Prices—$49.95, $54.95—with prop adapter (plus $5 S&H; New York residents add state sales tax).

Modelair-Tech, P.O. Box 12033, Hauppauge, NY 11788-0818; phone/fax (615) 979-1475; email: THunt95147@aol.com.



A&A ENGINEERING

Smart Battery Charger

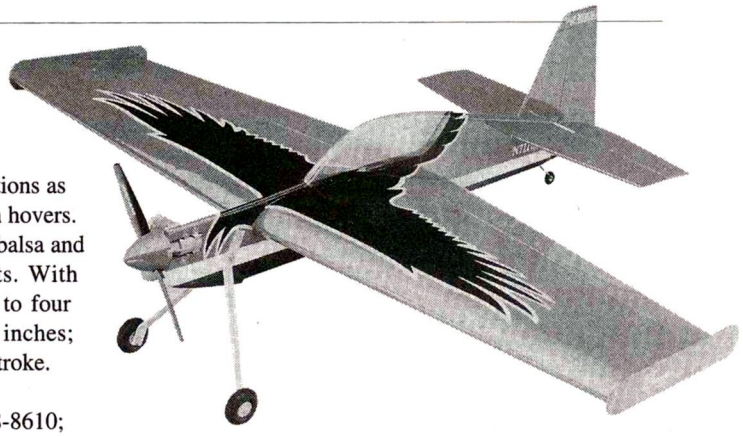
The Smart Battery Charger is for gel-cell or lead-acid batteries. It has three operating modes. Initially, it controls the charging current to a pre-set "bulk" value, then it tops off the battery with an elevated, "full-charge" voltage. After top-off, the maintenance mode keeps the battery at a precise, "float-level" value and will not overcharge. Great for 5 to 15Ah batteries. The standard assembled unit is 12 volts at 1 amp, and 6-, 14- and 24V versions are available at extra cost. The standard kit version is 12 volts at 0.5 or 1 amp, which the modeler can select while building it.

Prices—$59.95 (kit), $79.95 (assembled). California residents add state sales tax.

A&A Engineering, 2521 W. LaPalma, Unit K, Anaheim, CA 92801; (714) 952-2114; fax (714) 952-3280.

GLOBAL QUALITY KITS

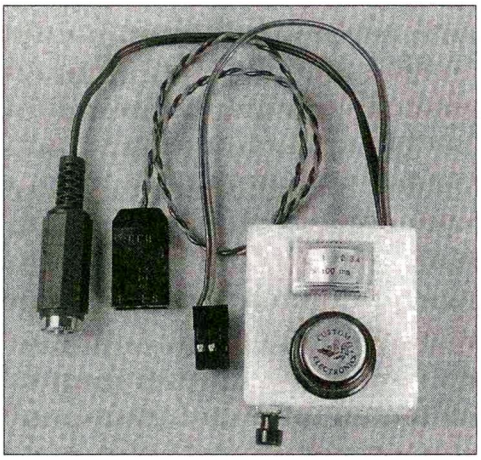
Raven Fun-Fly 40



Global's Raven Fun Fly 40 performs such outrageous aerial contortions as square knife-edge loops, floating flat spins, rapid-fire rolls and even hovers. Given a good breeze, it will look as if it's landing backwards! The balsa and plywood parts are precision die-cut and fall out of their sheets. With Raven's fast and easy construction, framing up takes only three to four hours. Specifications: wingspan—53 inches; area—838 square inches; weight (without radio)—54 ounces; engine required—.40 to .53 2-stroke.

Price—$89.95.

Global Hobbies, 18480 Bandilier Cir., Fountain Valley, CA 92728-8610; (714) 964-0827; fax (714) 962-6452.



CUSTOM ELECTRONICS

Charge Mate

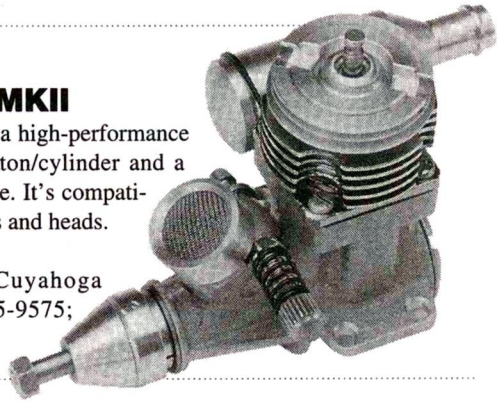
The Charge Mate is a unique charging adapter that plugs into your radio system charger, so you can charge a wide variety of battery packs. For example, with the Charge Mate, you will be able to charge 4- or 5-cell packs from 100mAh to over 2000mAh at the C/10 overnight rate. The three charging ranges are: low range—plugged into the RX side of your charger for charging packs of from 100 to 400mAh; medium range—plugged into the TX side of your charger for packs ranging from 400 to 1000mAh; and high range—plugged into both the RX and TX outputs, it charges packs from 800 to 2000mAh. Only 1½ inches square, Charge Mate comes complete with universal connectors that are compatible with Airtronics, Futaba, Hitec and JR batteries and chargers.

Part no.—CEL 1370; **price**—$31.95.

Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511; or directly from **Custom Electronics**, RR 1 Box 123B, Higginsville, MO 64037; (816) 584-6284; fax (816) 584-6285.

NORVEL

AME .061MKII



This Russian engine features a high-performance glow plug, a hand-fitted piston/cylinder and a machined, sand-cast crankcase. It's compatible with Cox Tee-Dee mounts and heads.

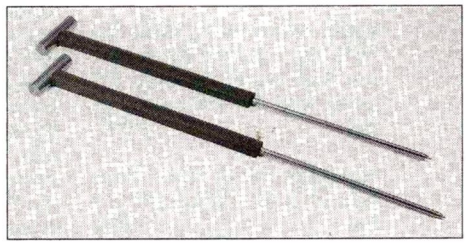
Price—$33 (plus S&H).

Norvel, 3656 State Rd., Cuyahoga Falls, OH 44223; (800) 665-9575; fax (216) 923-4349.

GT HOBBIES

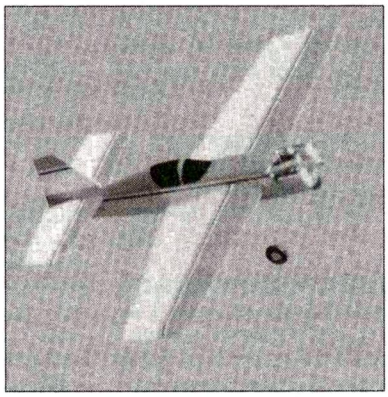
RC Plane Stoppers™

Now you can warm up your engine and adjust it without an assistant. Here's how: drive the Plane Stoppers into the ground ahead of the wing leading edge or stab to hold the model in place while the engine is running. REV-R-UP Plane Stoppers are made of anodized aluminum for strength and durability. High-density foam protects the wing. You've invested a lot of time and money on your model, so why not protect it and yourself with this restraint?



Price—$34.95 (plus $5 S&H).

GT Hobbies, P.O. Box 96, Neskoosa, WI 54457; (715) 886-4481.



HOBBY HANGAR

Ziroli Sukhoi

Nick Ziroli's ½A Sukhoi Su-26, featured in the January 1994 issue of *Model Airplane News*, is now available in an all-wood kit from Hobby Hangar. Specifications: wingspan—34 inches; wing area—245 square inches; engine—0.49 to .10. For 2- to 4-channel mini airborne packs; hardware pack included.

Hobby Hangar, 1862 Petersburg Rd., Hebron, KY 41048; (800) 611-3860.

CLASSIFIEDS

BUSINESS

MAKE REAL DECALS with your computer and printer. Send $10 for introductory kit to: LABCO, Dept. MAN, 27563 Dover, Warren, MI 48093. http://www.mich.com/~labco/ [2/97]

ENGINES FOR LESS: New and used save big money! O.S., SuperTigre, Fox, Enya, K&B, McCoy, Saito & more! All used engines come with lifetime tradeback guarantee! Consignment sales. Trade-in's too! Send legal-size S.A.S.E. or postage to get free list to: HWC, P.O. Box 94, Boystown, NE 68010. [11/96]

ANTIQUE IGNITION - GLOW PARTS CATALOGUE, ½-inch THICK. Timers, needle valves, cylinder heads, pistons, tanks, spark plugs, race car parts. Engines ½A, Baby Cyclone, McCoys, Phantoms, etc. $10 postpaid (U.S.), $20 foreign. Chris Rossbach, 135 Richwood Dr., Box 390, Gloversville, New York 12078. [2/97]

NEW ZEALAND AERO PRODUCTS. Scale plans: Rearwin Sportster, Hall's Springfield Bulldog, Typhoon, Pawnee, Airtruk/Skyfarmer, Agwagon, Pawnee Brave, Fletcher FU-24, DC-3/C-47, Fairchild PT-19, Fleet PT-26, Cessna Aerobat, and more. Hardware Paks, color photo paks available. Free documentation with plans. Catalogue/Price list: $5 (U.S.); Visa/MC. 34 Ward Parade, Stirling Point, Bluff, New Zealand. Phone/24-hr. fax 0064-03-212-8192. [2/97]

MODEL WARPLANES, 1996: over 10,000 plans, kits, photos, 3-views listed. Send SASE to John Fredriksen, 461 Loring, Salem, MA 01970 (508) 745-9849. [10/96]

PLYWOOD—Aircraft quality Finland Birch. Call for free price list: (800) 222-7853. [2/97]

SCALE AIRCRAFT DOCUMENTATION and Resource Guide. Larger, updated 1996 edition. World's largest commercial collection. Over 5,800 different color FOTO-PAAKS and 33,000 three-view line drawings. 188-page resource guide/catalogue—$8; Canada-$10; foreign-$15. Bob Banka's Scale Model Research, 3114 Yukon Ave., Costa Mesa, CA 92626; (714) 979-8058. [2/97]

R/C WARBIRDS ON VIDEO. Warbirds 95, Birds of Prey 95, Jumbo Jamboree 95, $19.95 each plus $3 S&H. A.M.R. Productions, P.O. Box 1813, Toms River, NJ 08754. [10/96]

SODA-CAN AIRPLANES—replica biplane detail plans with photos $7.50 PPD, Early's Craft, 15069 Valley Blvd. SP 26, Fontana, CA 92335. [8/97]

REPLICA SWISS WATCHES—18KT goldplated! Lowest prices! Two-year warranty! Waterproof! Divers, Chronographs, others! Phone (770) 682-0609; Fax (770) 682-1710.

AERO FX BY JO DESIGNS—exact-scale, computer-cut, high-performance vinyl graphics and paint masks. Lettering; nose art; insignia for scale; pattern, pylon and sport fliers; complete graphic sets available. Call or write for free sample and catalogue. JO Designs, Rt. 1, Box 225 AA, Stratford, OK 74872; (405) 759-3333; fax (405) 759-3340. [11/96]

ANTIQUE IGNITION engine parts: excellent reproductions, fuel tanks, points, timers, coils, needle valves, gaskets, etc. Champion spark plugs. Catalogue—$6 (intl. airmail—$8). Aero-Electric, 3706 North 33rd, Galesburg, MI 49053; (616) 665-9693. [10/96]

PLANS ACCURATELY ENLARGED or copied. Any scale, any size. Money-back guarantee. Send $2 for info and a customized poster for your shop. Roland Friestad, 2211M 155th St., Cameron, IL 61423. [12/96]

PLANS ENLARGING SOFTWARE—PLANS ENLARGING. Old magazines, scanning, plotting. Free information. Concept, Box 669A Poway, CA 92074; (619) 486-2464. [11/96]

HELICOPTER SCHOOL. Five days of hands-on instruction with X-Cell helicopters and Futaba and JR Radios. Small classes, tailored to meet your individual needs, beginning to expert. Includes all meals and lodging. Over 520 satisfied students from 23 countries and 44 states, logging 20,000 flights in the last seven years. Located on a 67-acre airport exclusively for R/C training. Owned and operated by Ernie Huber, five-time National Helicopter Champion and Designer. Send for free information and class schedule now! R/C Flight Training Center, P.O. Box 727, Crescent City, FL 32112; phone (800) 452-1677; fax (904) 698-4724. Outside of U.S., phone (904) 698-4275. [1/97]

DETHERMALIZING CERTAINTY. For most free-flight models. Weighs .7 - 1.2 grams. large SASE to Wheels & Wings, P.O. Box 762, Lafayette, CA 94549-0762. [3/97]

MIXERS & RETRACT CONTROLLERS! MicroMixer for flaperons, elevons, V-tails, flying wings! MicroRetracts sequences 3 servos in slow motion from one channel! These are tiny ⅓-ounce airborne computer controllers for standard radios! Without connectors, $29 each plus $2.25 shipping, Quillen Engineering, 561 N. 750 W., Hobart, IN 46342 (219) 759-5298. [10/96]

LARGE-SCALE SAILPLANES AND TOWPLANES—new and used—call (212) 879-1634, Sailplanes Unlimited, 63 East 82nd St., New York, NY 10028. [11/96]

R/C SKYDIVING: Thrilling free-falls, chute opens by transmitter. Parafoil Parachute duplicates all canopy maneuvers, turns, stalls, spirals, landing flares, etc. Latest catalogue $1. R/C Skydivers, Box 662M, St. Croix Falls, WI 54024. [3/97]

PLANS—R/C sailplanes, scale, sport and electric. Old-timer nostalgia and FF scale and sport-powered, rubber and towline. All models illustrated. Catalogue $2. Cirrus Aviation, P.O. Box 7093, Depot 4, Victoria, BC V9B 4Z2 Canada. [3/97]

FOUR SCALE CATALOGUES. SPPS 171 superscale plans; SPPS 130,000 documentation photos, three-views; Nexus scale plans handbook; Nexus scale drawings; $5 each, Canada & USA. Add $5 each air overseas. Pepino's Scale Plans and Photo Service, 3209 Madison Ave., Greensboro, NC 27403; (910) 292-5239; Visa, Mastercard. [11/96]

VINYL LETTERS, GRAPHICS & PINSTRIPES precisely cut to your specifications and pre-spaced for easy application, professional results. Free catalogue. Comp-U-Cut, 976 W. Foothill Blvd. Suite 328, Claremont, CA 91711. (909) 624-2906. E-Mail to: ddmc@cyberg8t.com [10/96]

BOEING 80A SCALE PLANS: 72-inch wingspan. Send SASE and $2 for information and picture. Sam Moss Productions, 909 Colebrook Dr., Santa Maria, CA 93454. (805) 739-9130. [11/96]

***SAITO* ENGINE REPAIRS:** Now available at A-Train Hobby by the Oldtimer. Other gas engine repairs also available. A-Train Hobby, 13503B Southeast Mill Plain Blvd., Vancouver, WA 98684; (360) 944-5403. [12/96]

GIANT-SCALE PLANS BY HOSTETLER. Send SASE to Wendell Hostetler's Plans, 1041 Heatherwood B, Orrville, OH 44667. Phone (330) 682-8896; fax (330) 683-5357. [6/97]

BUILDING SERVICE. Trainers to jets! We build them. You fly them. We are at the leading edge of R/C aircraft assembly technology. (407) 359-5387; (407) FLY-JETS. We specialize in trainers, sport, scale, giant scale & jets. www.iag.net/~aircraft, or E-mail aircraft@iag.net [10/96]

SHOOT GREAT IN-FLIGHT VIDEOS/PICS. Plans of proven camera carrying models! Take the guesswork out; save adapting your existing model! Pterodactyl, amazing .75-powered delta, hand launchable, lifts 4½ pounds. Loftus MK III, 11½-foot span takes forward looking cameras, developed for surveillance. Phoenix MK III, 14-foot span twin-boom design for 35 to 60cc engines. Send $U.S. $5 for info pack: Adrian Kingsford, 18 Taunton Place, Stoke, Nelson, New Zealand. [10/96]

R/C PHOTO CLASSIFIEDS—A photo advertisement magazine of new and used radio-control equipment. Advertise your product with an Individual Advertisement space in 2 issues for only $23. Subscription is only $48 for 12 issues and the magazine issues once every month. Hobbyists everywhere are looking for new and used equipment, and the R/C Photo Classifieds is the place to find them. Send Email to RCPHOTOCLS@AOL.COM (818) 417-8737. [11/96]

TV SHOW. The producers at Telstar Video Productions, Inc. are proud to present the nation's only weekly half-hour TV show dedicated to model aviation. "REMOTE CONTROL" television can be seen on Satellite Galaxy 4, channel 15 or on cable: The Outdoor Channel (Satellite T4, channel 11). Call (800) 972-4847, or fax (407) 220-4849 for affiliate list or more information. Note to manufacturers: 30- or 60-second commercial spots are available. Advertise your products on national TV to millions of potential customers! Internet: www.gate.net\~telstar\remoteco.htm [10/96]

WW I SCALE KITS—PFALZ DIII, LVG C.VI, SPAD XIII. All three @ 1/6 scale; SPAD XIII @ 1/4 scale. $1 for color brochure. Combat Scale Models, P.O. Box 92, Hopkins, MN 55343. [2/97]

EAGLE PRINTS: Large collection of multi-colored vinyl decals of USAF, U.S. Navy, USMC and NATO. More than 130 items in stock. Diameter—15cm. $1.20 each. For illustrated color brochure and sticker sample, enclose $2 to: Eagle Prints, P.O. Box 237, 8860 AE Harlingen, Holland. [11/96]

AIRCRAFT PLANS—HMI6 "Baby" Flying Flea Plans $20. Archive, Box 892, Wooster, OH 44691. [2/97]

EASY ENGINE CLEANER FORMULA. Easily clean varnish, carbon and dried oil from pistons, cylinders, heads. No steel-wool scrubbing. Send $5 for formula, Prism Resources, 82-2M Barholm Ave., Stamford, CT 06907. [12/96]

GEE BEE PLANS used for full-scale R-2, "Z." Ten airplanes, 1/3-1/24. Catalogue/News $4. Vern Clements, 308 Palo Alto, Caldwell, ID 83605; (208) 459-7608. [12/96]

AFFORDABLE CNC MILL. Sherline Retrofit. Complete and ready to use. For information: (847) 998-0821. [9/97]

PLANS, KITS, WW II, RACERS, GOLDEN AGE. Free flight, electric, rubber, R/C, display. New Stinson SR-10, P-40 kits. 20-page catalogue, $3.50. Bell Model Aircraft Co., 650 Pinecrest Dr., Largo, FL 33770. [1/97]

SUNGLASS DISCOUNTS—Serengeti, RayBan, Randolph, Vuarnet, Gargoyles, bollè, Swiss Army, Hobie. Free catalogue. RJS Accessories (800) 226-7571. [3/97]

EXPERIENCE, INGENUITY, SOLID CRAFTSMANSHIP. We build from kits, plans, scratch, or your imagination. Service fully guaranteed. Hangar Heins R/C Aircraft; (513) 528-7221. [3/97]

WW I PLANS—Over 600 in stock. Laser cut parts. Send $5 for illustrated catalogue to Clarke Smiley, 23 Riverbend, Newmarket, NH 03857. [3/97]

HOBBYIST

PAYING $200 each for the following toy metal outboard boat motors: Mercury MK-1000 (black), 35 HP Oliver, 60 HP Gale Soverign, also buying others. Gronowski, 140 N. Garfield Ave., Traverse City, MI 49686; (616) 941-2111. [10/96]

WANTED: Model engines and racecars before 1950. Don Blackburn, P.O. Box 15143, Amarillo, TX 79105; (806) 622-1657. [10/96]

ENGINES: IGNITION, GLOW, DIESEL—new, used, collectors, runners. Sell, trade, buy. Send $3 for huge list to Rob Eierman, 504 Las Posas, Ridgecrest, CA 93555; (619) 375-5537. [11/96]

MAGAZINE BACK ISSUES—*American Modeler, American Aircraft Modeler, Aeromodeller, Model Airplane News, Model Aircraft, RCM* and more; 1930s–1990s. For list, send SASE to Carolyn Gierke, 1276 Ransom Rd., Lancaster, NY 14086. [3/97]

WANTED: ignition model engines 1930s to 1950s, especially Elf, Baby Cyclone, Brown Jr., Ohlsson Custom and Gold Seal. Also model racecars, any parts, spark plugs, etc; Woody Bartelt, 3706 North 33rd, Galesburg, MI 49053; (616) 665-9693, or (800) 982-5464. [11/96]

CASH FOR ENGINES: ignition, glow, diesel–all types; any condition; sale list, too! Estates my specialty! Send SASE for list. Bob Boumstein, 10970 Marcy Plaza, Omaha, NE 68154; (402) 334-0122. [11/96]

WANTED: Old, unbuilt, plastic model kits from '50s and '60s. Send list, price to Models, Box 863, Wyandette, MI 48192. [2/97]

COLLECTION FOR SALE: Over 350 kits from 40's, 50's, 60's, F/F, R/C, U/C, Rubber, Solids, Jetex. Send SASE ($.55) to Dr. Frank Iacobellis, 62 Palisade Rd., Rye, NY 10580, or call (914) 967-5550. [11/96]

MODEL MOTORS WANTED: most types, 1970 and earlier. Cash or trade. T. Crouss, 100 Smyrna, West Springfield, MA 01089. [12/96]

WANTED: Cox, Wen-Mac, Testors, etc. Gas-powered plastic cars, planes, boats. Please call or write. Dean Barham, 4032 Iowa St., San Diego, CA 92104; (619) 528-1680. [10/96]

SLOT CARS WANTED: Cox, Aurora Tyco, etc. 1960's, 1970's vintage; any scale. Please call or write. Dean Barham, 4032 Iowa St., San Diego, CA 92104; (619) 528-1680. [10/96]

P-38 LIGHTNING—LOVE IT? Join a group of P-38 modeling and full-size enthusiasts. Share modeling, flying, historic facts and articles about the P-38. Entering fee of $15 covers newsletters and club patch. For more information, write: P-38 M.O.I. Ron Parker, 3003 Windchase, #1003, Houston, TX 77082-3444. [10/96]

WANTED: Model engines and racecars before 1956. Don Blackburn, P.O. Box 15143, Amarillo, TX 79105; (806) 622-1657. [12/96]

WANTED: Built or partially built scale Cessna 150, 152, or 172. Glen Mills, P.O. Box 3393, Mission Viejo, CA 92690; phone (714) 768-0585; fax (714) 458-6455. [12/96]

HERCULES MODEL TUG BOAT—36 inches long, steam powered (Saito 2-cylinder) forward and reverse, steam whistle, smoker, never used, display case—$1,500. For more information, call weekdays, John Wanner (602) 948-2720. 7595 E. Gray Rd., Scottsdale, AZ 85260. [10/96]

FOR SALE—Mitchell B25 built from Ziroli plans. Panel lines, rivets, lights, 3-blade props with hubs, SuperTigre 2,500's with CNH ignition, Robart retracts with operating gear doors, 6-channel JR radio. Photos available for serious buyers only. Contact Ken Currens (818) 337-8802. [10/96]

WANTED COX BOATS: Water Wizard, See Bee. Hydro-Blaster. Dean, 4032 Iowa St., San Diego, CA 92104. [12/96]

DEBOLT PLANS: radio control, control line, free flight. Separate SASE for each list. Fran Ptaszkiewicz, 23 Marlee Dr., Tonawanda, NY 14150. [3/97]

MODEL AIRPLANE NEWS AND R/C MAGAZINES. All titles, 1950s-1990s. Many specials. Want lists and SASE to: Jim, 237 S. Genoa, Genoa, IL 60135. [10/96]

WANTED: Pilot kit, Bellanca Super Decathlon Quarter Scale. Complete kit or partially built. Don Brann, 37785 Amber Dr., Farmington Hills, MI 48331. (810) 543-1950 or (810) 553-6711 evenings. [10/96]

MODEL AIRPLANE NEWS, 1930-1980; "Air Trails," 1935-1952, "Young Men," 1952-1956; "American Modeler," 1957-1967; "American Aircraft Modeler," 1968-1975. $1 for list. George Reith, 3597 Arbutus Dr. N., Cobble Hill, B.C., Canada VOR 1L1. [3/97]

EVENTS

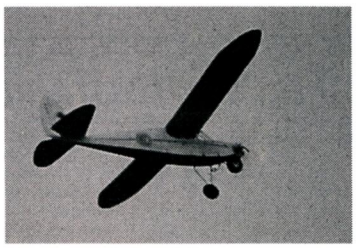
"NOT TONIGHT HONEY, I'M SWAPPING TOMORROW!" Largest swap shop in the Midwest. Presented by the HobbyTime Flyby Knights on Saturday, November 2nd, 1996, at the ODEUM Sports and Expo Center, 1033 Villa Ave., Villa Park, Illinois 60181. Over 250 tables! 20,000+ sq. ft. of swapping madness! Free parking for over 2,000 cars. Multiple table discounts. Vendors and hobby shops welcome. 8 a.m. vendor setup; 10 a.m. general admission. For table rental/flyer/motel list/info call: (630) 837-8437; fax (630) 837-7239. [11/96]

RATES: non-commercial—25 cents per word (no commercial ads of any kind accepted at this rate); commercial— 50 cents per word (applies to retailers, manufacturers, etc.); count all initials, numbers, name and address, city, state, zip code and phone number. **All ads must be paid for in advance.** To run your ad for more than one month, multiply your payment by the number of months you want it to run. Deadline: the 10th day of the month, 3 months in advance, e.g., *January 10 for the April issue.* We don't furnish box numbers, and it isn't our policy to send tear sheets. Please make all checks payable to: **AIR AGE, INC. SEND AD AND PAYMENT TO: CLASSIFIED ADS, Model Airplane News, 251 Danbury Rd., Wilton, CT 06897-3035, or call (203) 834-2900.**

ADVERTISER INDEX

WORLD'S LARGEST R/C MODEL?

When I first saw the Super Quaker at this year's Joe Nall Giant-Scale Fly-In, I thought I was looking at an ultralight aircraft, but there was no seat or control stick! The Super Quaker redefines the definition of large R/C models.



Yes, it does fly! Early in the morning or late in the afternoon when the winds are calm, the Super Quaker flies regularly from Hartness Field. The model flies faster than a full-size 90hp Piper Cub!

THINKING BIG

When Pat Hartness and his friends Kirby McKinney and Eddie Clark decided to build a big model, they used plans for the Quaker—a 1936 free-flight model—and enlarged it five times, which produced a wingspan of 27.7 feet.

Construction is all wood—Douglas fir to be exact. The fuselage is traditional stick construction with stringers, verticals and diagonal segments assembled flat on the workbench over the plans. The plywood firewall is sheathed with a stainless-steel sheet facing. To add torsional stiffness, plywood sheeting runs along the inside of the fuselage sides back to the wing's trailing edge.

Sitting on the flightline, the Super Quaker redefines the term "big model." Or are those 1/5-scale people walking around it?

The one-piece wooden wing has a solid, laminated main spar. In the center, the spar measures 5x5 inches, and it tapers in width toward the tips. The wing isn't braced with struts or cables; it's fully cantilevered just like the smaller Quaker model. The ribs are laser-cut out of lauan plywood.

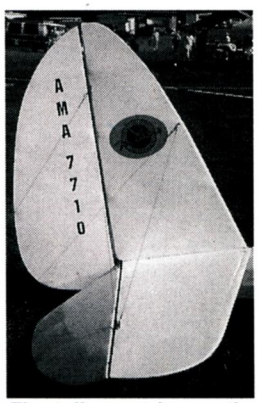
To transfer flight loads to the fuselage, the well-engineered wing attachment uses four large aluminum L-shaped extrusions, and the hardware is aircraft-grade. The tail feathers have laminated trailing edges, and the stabilizer bolts to the top of the fuselage with four large bolts. The vertical stab bolts to the horizontal stab, and the entire tail group is braced with cable.

The elevator halves are joined at the center and supported with an aluminum gusset. Pull/pull cables and twin metal pushrods supported with Delrin guides control the tail surfaces.

The landing gear is made of welded chromoly-steel tubes, and bungee cord absorbs the landing shocks. The wheels are from an ultralight, and the tires are industrial grade. The covering is Stits 1.7-ounce fabric painted with urethane.

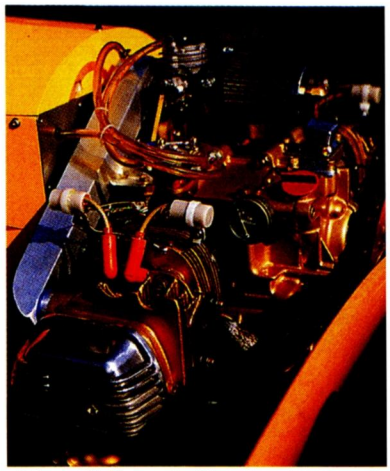
BIG PONIES

A beautiful Christine 1200cc, air-cooled, twin-cylinder, 4-stroke (half a Volkswagen engine) powers the model. It has an electronic ignition system powered by two 6V, 10A batteries, and it produces 43hp turning a 62x22 prop. The fuel tank holds 3½ gallons of gas, static rpm is 2600, and cruise speed is about 1800rpm. The all-up wet weight of the model is 407 pounds, and the wing loading is a light 4 pounds per square foot.



The tail group is exactly like the model, except a lot bigger, and it's braced with steel cables.

The attachment point for the tail-bracing cables.



A beautifully made Christine 1200cc air-cooled, 2-cylinder, 4-stroke engine powers the Super Quaker. The engine is actually half of a 4-stroke Volkswagen engine modified for aircraft use.

DUAL RADIO

Two complete radio systems are used to fly the Super Quaker—a Futaba* 9ZAP and a JR* 388S. Two receivers and the ability to switch from one receiver to the other are controlled by the master Futaba system. Also, a fail-safe system automatically switches systems in case of signal loss or interference. Seiko SSPS 105s servos (two per control surface) each produce 5,278 ounces of torque. Two 6V, 10A batteries power the receivers, and a 12V, 10A battery powers the servos. There are no ailerons.

The Super Quaker is flown early in the morning or at sunset because the wind conditions are calmer. The sound of the 1200cc Christine engine is awesome. The model is easy to taxi, and the take-off roll is short (maybe 200 feet). Having only three channels (rudder, elevator and throttle), the Super Quaker is very easy to fly. Pat doesn't just putt-putt around the sky; he does loops and three-turn spins. Touch-and-go's and high-speed flybys are all in his flight log.

The Super Quaker is an amazing piece of work. After I saw it fly, I was left wondering about the original Quaker model. Could it be considered a 1/5-scale model qualifying for scale competition?

—Gerry Yarrish

**Address are listed alphabetically in the Index of Manufacturers on page 122.*